DEPARTMENT OF MEDICINE

THE EXTENDED CLINICO-LABORATORY PROFILE OF THE FEMALE PARTNER OF INFERTILITY IN BUNDELKHAD REGION

THESIS FOR

DOCTOR OF MEDICINE

M.L.B. MEDICAL COLLEGE

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Certificate

This is to certify that the work entitled **"TO STUDY THE EXTENDED CLINICOLABORATORY PROFILE OF THE FEMALE PARTNER OF INFERTILITY IN BUNDELKHAND REGION"** which is being submitted as a thesis for M.D. (Medicine) examination, 2002 of Bundelkhand University by **Dr. Jaya Krishnan** has been carried out in the department of Medicine, M.L.B. Medical College, Jhansi.

She has put in the necessary stay in the department as per university regulations.

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Introduction

INTRODUCTION

Infertility can be defined as inability of a couple to achieve a pregnancy after one year of unprotected intercourse. Impaired fertility, variously described as infertility or sub-fertility, may be due to a relative or absolute inability to conceive. It affects both men and women in approximately equal proportions, causing considerable personal suffering and disruption of family life.

The best strategy for dealing with the problem of infertility is its prevention. Although some cases of impaired fertility can be corrected by simple measures, other cases require complicated diagnostic procedures and treatment.

An empathic approach to individuals and couples who have infertility problems is required. This includes an appreciation of cultural and social customs, the individual's perception of sexuality, an understanding of the reproductive function and an awareness of the aetiology and prevalence of infertility in the community.

Prevelance of infertility are not very accurate and vary from region to region, it is estimated that 10-15% of couples experience some form of infertility problem during their reproductive lives.

Infertility can be due to male factors and female factors or a combination of these. Male factor accounts for 40% of the infertility problems. The causes of male infertility may be classified as : abnormal spermatogenesis ; disorders of secretory function of accessory organs ; obstruction of the genital tract ; and abnormal sperm function. The causes

of female infertility are : ovulatory disorders ; tubal occlusion ; peritoneal factors, eg. pelvic inflammatory disease (PID) and endometriosis ; cervical factors and luteal phase defect in which ovulation occurs but progesterone formation is insufficient for implantation. Conception is a complicated process that depends upon many factors : on the production of healthy sperm by the man and healthy eggs by the woman : unblocked fallopian tubes that allow the sperm to reach the egg ; the sperms ability to fertilize the egg ; the ability of the fertilized egg (embryo) to become implanted in the uterus ; and sufficient embryo quality. When just one of these factors is impaired; infertility can result.

The public need to be made aware, through education programmes, of factors which affect fertility. It should be widely publicized that infection caused by STDs is a common cause of infertility. In addition, the contribution of infection caused by poor obstetric care and unsafe abortion should be stressed.

These could be fulfilled by promoting programmes such as :

- the control of sexually transmitted disease, including the use of STD diagnostic kits, the promotion of safe sex, and the use of condoms ;
- better obstetric care at the primary health care level, including adequate training of traditional birth attendants;
- the prevention of unsafe abortion by improving access to effective contraception and safe abortion services ;
- improving availability of reproductive health services (including information and education) for adolescents.

Couples are generally advised to seek medical help if they are unable to achieve pregnancy after one year of unprotected intercourse. The knowledge of the various causes of infertility is vital for the physician. A physician should understand that infertility is a stressful condition and people vary in their emotional response to it and their ability to cope.

The physician should have the following objectives in his mind when he is counselling an infertile couple.

1. To dispel any misinformation and misconceptions and educating couple about its prevalence, causes and contribution of the male and female factors, timing of intercourse.

2. The couple should be investigated thoroughly to find out the cause of infertility. After proper history taking and detailed physical examination, the male should be subjected to semen analysis and the female is investigated according to her menstrual cycle.

3. It is important to recognize the burden placed on couples seeking infertility treatment by many of the diagnostic and therapeutic procedures involved. They must be offered counselling and support because of the stress and anxiety caused by their persistent infertility and the complexity of the procedures involved. Where infertility treatment is unavailable or unsuccessful, physician should support and counsell individuals and couples to help them to come to terms with infertility.

4. There are 10-15% of couples with no known cause for their infertility. They should be informed about the various assisted reproductive techniques.

The introduction of in-vitro fertilization and other assisted reproductions technologies have enlarged the possibilities for successful treatment and provided an opportunity to study basic reproductive process.

The development of medically assisted conception has brought new social, legal and ethical issues related to the management of infertility. These issues involve : respect for the dignity and integrity of the human being ; protection of human genetic material so that it is not misused, or used inappropriately without the donor's consent ; and the need for quality of care. With the striking changes in infertility practice, introduction of new techniques of assisted reproduction, better cooperation and communication between the physician and the couple study of infertility has emerged as one of the most dynamic and interesting field of medicine.

Review of Literature

REVIEW OF LITERATURE

The literature suggests repeatedly that infertility has always engaged the interest of mankind since ancient times.

The first written understanding of infertility dates back to the Egyptians. They described the use of various tampons and suppositories in the management of pelvic disorders. To regulate menstrual irregularities, the patient was advised to use douche of wine and garlic.

Hippocrates (460-370 B.C.) was the first author of various medical works dealing with Greek gynaecology. According to Hippocrates semen was considered a concentrate from every part of male body. He described the role of obesity in subfertility. His writing discussed diagnostic test to evaluate infertility.

Seranis believed that failure of conception was secondary to improper timing of sexual intercourse.

In 1953, Andréas Vesalius contributed an accurate description of the entire female genital system. Name of Gabriele Fallopio of Modena is permanently connected to that part of the genital system known as fallopian tube. Reijnier de Graaf in 1672 described the role played by the ovary and described the female ovum. Marcello Malpighi in 1668 named the corpus luteum.

Lazzara Spallanzani in 1780 showed that conception was acheived as a result of contact between eggs and sperms.

Marion Sims played an important role in establishing the role of secretion in affecting sperm survival in the genital tract. Max Huhner

introduced in 1913 the post coital test. Anugns Martin in 1889 exonerated retroversion as a cause of infertility.

Alwin Mackenrodt reported the first successful tubal surgery in 1894. To evaluate tubal patency, Isidor Rubin introduced in 1920 the utero-tubal insufflation test. Bernhard Zondek and Selman Aschheim demonstrated the presence of prolan A and B , now known as follicle stimulating hormone and luteinizing hormone.

Robert Morris, Joseph Halban and Heimen Rubinstein first documented the endocrine function of the ovaries.

Meyer and Ivanoff propounded the theory behind enodometriosis, an important cause of infertility.

The development of endoscopy has added to the progress in the evaluation and management of tuboperitoneal disease. Laproscopy was introduced in the United states during the 1920's.

Not only is the study of infertility becoming increasingly important, but it is also becoming increasingly exciting because of a technological explosion in the biology of reproduction. For example, the techniques for inducing ovulation that have been introduced over the past several years have dramatically improved the prognosis for patients with ovulatory disturbances. Present investigation in ovulation induction promises to yield even more effective agents in the not too distant future. In addition , medicine is at the threshold of understanding the possible role of the immunology system in reproduction, and the male reproductive system , long ignored, is now better understood and may consequently be more readily treatable. Finally, the refinement of microsurgical techniques and

the possibility of extra-corporeal fertilization and re-implantation are encouraging new and potentially beneficial approaches to tubal problems.

It can be seen , then, that the study of infertility, once an area mired in superstition and empiricism, has emerged as one of the most exciting and dynamic fields of medicine. In the future, the demand for physicians who understand and have the ability to treat this problem can only increase.

Definition of Infertility

The WHO scientific group has suggested the following definition of infertility -

"Having had consummated the marriage without the use of contraceptive , a couple fails to achieve a pregnancy for a period of one year or more is infertility".

Infertility is termed "Primary" when conception has never occurred. "Secondary" where one or more pregnancies are followed by one year of involuntary bareness.

Incidence of infertility in any community varies between 10-15%.

A review of literature reveals the following information on the major causes of infertility and their incidence.

1. Gross pelvic pathology - 5%.
2. Cervical factor - 20%.
3. Tubal factor - 30-40%.
4. Endocrine factor - 15-25%.

5. Male factor - 30-40%.

6. Miscellaneous 1-3%.

7. In both partners - 21-38%.

8. No cause found -3-14%.

Normal Ovarian Activity -

The cyclical ovarian activity depends on a feedback system involving the hypothalamus, anterior pituitary and the ovary. At puberty the levels of gonadotrophins rise due to an increase in the activity of the hypothalamic neurons responsible for synthesising gonadotropin releasing hormone(GnRH). This decapeptide releases the secretion of LH and FSH from the anterior pituitary by interacting with specific receptors on the cell membrane of the gonadotroph. Normal activity is dependent on stimulation by both LH and FSH secreted by the anterior pituitary in response to pulsatile stimulation by hypothalamic GnRH. Continuous exposure of the anterior pituitary to GnRH either by constant infusion of the natural decapetide or by the administration of long acting analogues results in suppression of gonadotrophins and a hypogonadotrophic state.

Under normal physiological circumstances the frequency of LH pulses (and presumably GnRH pulses) changes throughout the different stages of the ovarian cycle. Normal follicular development requires an adequate concentration of FSH in the early follicular phase of the cycle followed by frequent pulses of LH occurring at intervals of approximately 60-90 minutes. The mechanism by which a single follicle is selected in the early follicular phase of the cycle for ovulation is not completely understood.

The dominant follicle, by suppressing the concentration of FSH below this threshold level, ensures that only a single follicle develops each month. It seems likely that it is the secretion of oestradiol from the dominant follicle which suppresses the concentration of FSH below the threshold level.

LH stimulates the production of androgens by interacting with specific receptors on the theca cells. Androstenedione and testosterone are then used as precursors for the synthesis of oestradiol. Thus, the secretion of oestradiol depends on both gonadotrophins ; LH stimulating the synthesis of the androgen precursor and FSH providing the enzyme system necessary for the final conversion to oestrogen.

Estrogen levels continue to rise and eventually exert a biphasic (positive) feedback on the hypothalamic pitutary system that results in a burst of LH and a lesser burst of FSH. Approximately 24 hrs later an ovum is extruded from the mature graffian follicle. After ovulation the graffian follicle becomes corpus luteum which then starts secreting progesterone and contributes to the production of estrogen. The two hormones then brings about endometrial transformation to secretory lining in preparation for pregnancy. If pregnancy does not occur the corpus luteum degenerates, progesterone and estrogen production begin to fall and menses results.

There are various factors , single or multiple which contribute to infertility in the female patient and hence for any study to complete it is vital to know how these factors are responsible.

I. Ovarian Factors -

Ovarian factors are one of the major causes of infertility accounting for 30-40% of all cases of female infertility. Ovarian causes may be classified as

(i) Endocrinal (ii) Inflammatory (iii) Neoplastic (iv) Congenital

a. Endocrinal Factors -

A normal hypothalamic-pitutary-ovarian-uterine axis must be intact and functioning to result in rhythmic ovarian stimulation, ovulation and menstruation. There are a number of endocrine disorders which disturb ovulation like-

(a) Deficiency of gonadotropins.

(b) Sclerocystic ovary syndrome.

(c) Thyroid disorders - Both hyper and hypothyroidism.

(d) Disorders associated with excess prolactin production.

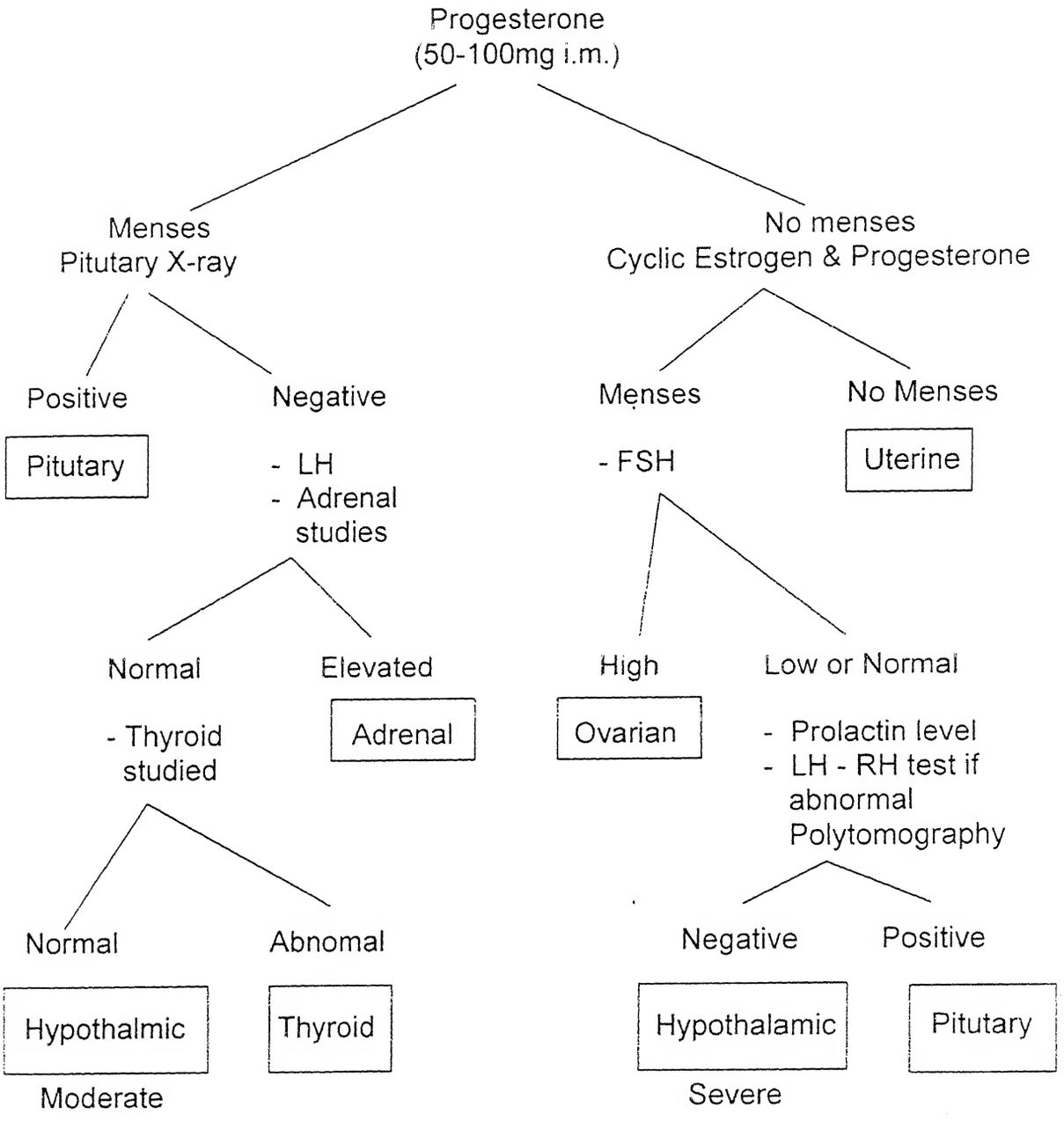
(e) Adrenal disorders.

(f) Virilizing syndromes.

(g) Primary ovarian failure.

- Anovulation is often associated with amenorrhoea or oligomenorrhoea. In amenorrhoea not only is follicle rupture inhibited, but ovarian secretion of estrogen is diminished to where endometrial stimulation results in lack of bleeding associated with endometrial breakdown.

Anovulatory cycles indicate the presence of functioning endometrium , so the search for causes of anovulation lie in the hypothalamus, pitutary or ovary. Also abnormal luteal phase has been implicated as a cause of unexplained infertility. Luteal phase deficiency results from inadequate progesterone secretion by corpus luteum and inadequate malnutrition of the endometrium.



A flow sheet for diagnosis in anovulation

b. Inflammatory -

It includes chronic perioophoritis where the presence of dense surrounding adhesion with possible thickening of the tunica albuginea, plays an important role in preventing the extrusion of ova at ovulation. Microscopically, chronic perioophoritis appears as a layer of newly formed connective tissue, in various stages of organization, involving the ovarian surface sometimes in small scattered areas.

c. Neoplastic -

Ovarian tumours such as pseudomucinous cystadenoma may cause sterility because as the cyst grows bigger and bigger, the normal ovarian tissue is destroyed more and more. Ultimately it so happens that no normal ovarian tissue is left. Secondaly, these tumors and also periovarian cyst that grow between the layers of broad ligament which are separated gradually with the increase of growth, presses on the fallopian tube and close its lumen. With further increase in growth , the normal position of uterus is also disturbed.

d. Congenital -

Congenital defect or absence of the uterus and ovary is a very rare disorder but may be responsible for infertility in a small proportion of cases.

II. Tubal and Peritoneal Cause-

30-40% of female sterility has a tubal factor in it. In two thirds of these cases a total organic block exists, for which there is no other solution except surgery. The remaining third consists of stenotic lesions or peritubal adhesions or dysfunction which can be treated with non operative therapy.

For pregnancy to occur besides mechanical patency of the tube, its correct functions, including secretion, peristalsis are required.

a) gonococcal tubal obstruction.

b) Tubercular tubal obstruction.

c) Post delivery and post abortal tubal obstruction.

d) Tubal obstruction caused by endometriosis.

e) Tubal obstructions due to extra genital peritonitis.

The risk of infertility increases with every episode of PID. Tubercular salpingitis more frequently is latent but a sterile patient may show obvious lesions of tuberculous adnexal disease in full evolution. Tuberculous endosalpinx is the most common cause of tubal block in primary infertility.

Post partum and postabortal salpingitis are the most common cause of tubal block in secondary sterility. Streptococcus is a common cause of post partum and post abortal pelvic infections, giving rise to usually unilateral tubal lesions and lead to complete obstruction less often than do gonococcal lesions where the presentation can be from most acute to most latent.

III. Uterine factors -

Problems with the uterus itself are not a common caue of infertility.

(a) Congenital anomalies of uterus -

Deformities most likely to cause problems are the septate and bicornuate uteri. More than 50% of women with uterine anomalies have no difficulties, it is important to rule out all other causes of infertility in such patients.

(b) Uterine Myomata -

Uterine myomata is thought to cause both primary infertility and habitual abortion. Incidence of infertility associated with uterine myomata has been reported to be as high as 40 percent. Submucous fibroids distort the endometrial cavity interfering with sperm migration, the nutrition of the endometrium may also be affected and thus implantation is prevented. Large intramural fibroid disturbs the endometrial cavity, and if present near the endocervical canal can block sperm migration. Intra ligamentous fibroids can also interfere with normal tubo-ovarian relationships.

(c) Uterine synechii (Asherman's syndrome)

It is a rare cause of secondary infertility where partial or complete obliteration of the endometrial cavity by adhesions occurs. It usually results due to infection during dilatation and curettage or excessive curettage.

(d) Malposition of the uterus -

Fixed retroversion of the uterus is commonly associated with chronic adhesive pelvic inflammatory disease and endometriosis. In such cases it may play some causative role in sterility. Non adherent retrodisplacement of the uterus is an infrequent cause of sterility.

(e) Others -

Tubercular endometritis a cause of infertility can be diagnosed by endometrial biopsy. Other causes include bacterial invasion following D & C, or IUD, endometrial invasion with mycoplasma.

IV. Cervical Factor -

Cervical factor accounts for 5% cases of infertility. Cervix serves as a passageway filter and storage site for spermatozoa. The main factors that ensure rapid progression of spermatozoa are anatomic adjustments of the cervix , and the alteration in the physical nature and molecular structure of the cervical mucus under the influence of oestrogen.

(a) Mucus of unfavourable consistency and character

This may be caused by -

- Deficiency of estrogenic phase. .
- Endometriosis and ovarian cystic conditions.
- Failure of cervical glandular response.

Infection of the cervix with *Chlamydia trachomatis* as in cases of chronic cervicitis, immunological causes like presence of spermatozoal antibodies in the cervical mucus also makes it hostile.

(b) **Cervical Polyps** - Cervical polyps which is localised heaping of cervical mucus may to serve as mechanical barrier to sperm transportation.

V. Vaginal Factors -

Vaginal infection does not causes infertility usually as majority of sperm get into the cervical canal fast enough to be affected by lower genital tract infections.

VI. Psychogenic Factors -

Psychosocial distress has evolved to be an important cause of infertility, such distress should be most evident in infertile women whose etiologies are most able to respond to environmental change.

Psychosocial therapy directed at strengthening the individual social support network may prove to be among the more valuable treatments for some forms of infertility in women.

VII. Immunological causes -

Abnormal autoimmune function can affect fertility by preventing conception. Studies have shown that total immunoglobin levels could serve as a potential marker for abnormal lymphocyte function in infertile women with abnormal autoimmune function such as unexplained infertility, endometriosis patients, individual with sperm antibodies, in females with premature ovarian failure.

VIII. Idiopathic Infertility -

When the diagnostic assessment of infertility reveals no abnormality, the appropriate diagnosis is unexplained infertility. It accounts for approximately 10% cases of infertility. The category of unexplained fertility includes a substantial proportion of couples who have defects in follicular development, ovulation, fertilization and the prerequisites for recognition and maintenance of early pregnancy. Minority of couples with unexplained infertility are truly normal with normal but below average fecundility. A

higher proportion of couples have impaired fertility related to female age beyond 30 yrs.

IX. Environmental Causes -

Various environmental factors have been shown to reduce fertility like coffee consumption, smoking. Also exposure to car exhaust, textile dyes, dry cleaning chemicals lead, mercury, cadmium, anaesthetic agents, welding increases the risk of infertility in women. MSG (Monosodium glutamate) a common flavor enhancer added in foods was found to cause infertility in test animals.

INVESTIGATING A PATIENT OF FEMALE INFERTILITY

In general, any couple seeking help for infertility should be evaluated and should undergo at least a preliminary investigation. However, it is important that a couple not be subjected to the rigors of an infertility investigation if the frequency and timing of intercourse or the length of coital exposure has not been adequate.

It is the consensus that couples should have had at least one year of unprotected intercourse before being considered for an intensive infertility investigation. One the other hand, it is felt that a couple should not be turned away before the arbitrary limit of a year if the woman is over 30 years old ; if a problem, such as a history of pelvic infection, is apparent ; or if the couple appears overly concerned about their problem. At the least detailed history should be taken, and a physical examination of both partners should be performed. Clearly, if the woman appears to be

anovulatory or the husband has smaller than normal testes, there is no gain in waiting to start an investigation. Furthermore, such basic tests as a semen analysis and recording of basal body temperature are easily done and are inexpensive. This type of preliminary investigation must be tailored to the couple. For some, these procedure will provide reassurance that everything is probably all right; for others, even the simplest measure will aggravate anxieties.

The fist visit provides an excellent opportunity to outline the requirements for the basic infertility investigation which will be conducted if it is decided to proceed after the histories and physical examination are completed. The couple can be explained the basic reproductive mechanism, to indicate where problems may be found, and to inform the couple of the probable prognosis. At this stage, it is also of utmost importance to establish a good rapport and a climate of reassurance. Establishing a trusting relationship is, of course important in all forms of medical care, but it is essential in infertility studies, because the investigation is often costly, time -consuming and emotionally trying.

Because infertility is not, as commonly thought, strictly a "female problem", motivation as a *couple* needs to be emphasized. The couple should be encouraged to be open in their communications with each other and with the physician. Unless the situation is handled carefully, an infertility investigation places many psychological stresses on the couple who may already be troubled about their reproductive failure and sexual compatibility.

The rate of which pregnancy is achieved depends on the number of coital exposures -

No. of coital exposure/	% pregnant in 6 months
1	25 %
2	33%
3	50%
4 or more	60%

The average length of time needed to achieve conception for a normal couple at the age of maximum fertility is 5.3 months.

1 month of protected intercourse - 25% of couple achieve preg.

6 month of protected intercourse - 63% of couple achieve preg.

9 month of protected intercourse - 75% of couple achieve preg.

12 month of protected intercourse - 80% of couple achieve preg.

Investigations

(i) Routine investigation consisting of blood tests and Chest X-ray

(2) Test for detection of ovulation.

(a) Basal body temperature (b) Endometrial biopsy

(c) Hormonal study. (d) Fern test

(e) Ultrasound (f) Cytology

(3) Tubal patency test

(a) Tubal insufflation test (b) Hysterosalpingography

(4) Investigation for Cervical Factors

(a) Post coital test (b) Anti sperm antibody test

(5) Hysteroscopy

(6) Laproscopy

(7) MRI

TEST FOR OVULATION

1. Basal body temperature

Indirect confirmatory evidence of ovulation should be obtained by use of basal body temperature (BBT) charts. The temperature can be taken orally with a regular thermometer. It is worth emphasizing that the temperature is best taken immediately upon awakening and before any activity. It is established that the BBT falls at the time of ovulation by about 1/2 degree Fahrenheit under the effect of estrogen. Following ovulation, progesterone produced by corpus luteum causes a rise in temperature by 5°-1°F.

Use of the BBT chart has been criticized because a small percentage of women who ovulate have monophasic graphs, and there is often disagreement among physicians concerning interpretation of individual charts. Moreover, the time of ovulation predicted by the BBT does not always correlate well with measurements of the LH surge or with

perceptions of maximal cervical mucus production. This test confirms ovulation but does not predict it. There is a relationship between a nadir in the BBT and LH surge, but the BBT is reliable in predicting the day of the LH surge only within 2 to 3 days (Quagliarello·J et. al.). Although the nadir is believed to represent the beginning of the LH surge, the occurrence of a nadir is variable and often is not detected. To be used prospectively to predict ovulation, nearly absolute cycle regularity is required.

Nevertheless BBT is still helpful as a preliminary indicator of ovulation and as a tool for explaining patients the timing of intercourse (Clinical gynaecologic Endocrinology and Infertility by Leon Speroff).

A significant increase in temperature is not noted until two days after the LH peak, coinciding with a rise in peripheral levels of progesterone to greater than 4 ng/ml (Luciano AA et al). Physical release of the ovum probably occurs on the day prior to the time of the first temperature elevation. The temperature rise should be sustained for 11 to 16 days, and it will then drop at the time of the subsequent menstrual period.

If an approximate time of ovulation can be determined by temperature charts, a sensible schedule for coitus is every 36 to 48 hrs. in a period emcompased by 3 to 4 days prior to and 2 days after expected ovulation. It is estimated that sperm retain their ability to fertilize for 24 to 48 hours and that the human egg is fertilizable for 12 to 24 hours.

Martinez AR et al (1992) evaluated 172 BBT charts while the average true positive rates was 90%, the false negative rate was only 2% . The remaining graphs (8%) were classified as non-interpretable, probably

reflecting measurement problems. Retrospective assessment of 210 biphasic records showed the thermal nadir to occur within one day of the urinary luteinizing hormone (LH) surge in 75% of the cases and in 90% when 2 days were considered. This confirms BBT as a relatively accurate guide for retrospective identification of the periovulatory period.

2. Endometrial biopsy

Sampling of the endometrium for assessing progesterone by the corpus luteum is another method giving evidence of the presence or absence of ovulation.

A small sample of the lining of the uterus (endometrium) is obtained within 12 to 18 hrs. after the start of menstrual flow. It has been claimed that at this time the endometrium is difficult to read, but most pathologist have no difficulty. The cyclic change in the endometrial glands and stroma, corresponding to the days of the menstrual cycle, were classically described by Noyes and his co-workers. The first sign of ovulation occurs on day seventeen with subnuclear vacuolation according to Noyes, Herting and Rock.

I.D. cooke studied endometrial biopsy and serum progesterone in infertile females. It is of particular interest that ovulatory serum progesterone concentration were associated with secretory phase endometrial biopsies in 45.6% of cases. Conversely, it was noteworthy that in 12.1% proliferative phase endometrium was found in patients who were also recorded as having an ovulatory serum progesterone concentration. It was also striking that mixed histological pictures and even atrophic

patterns were found in those with ovulatory concentration serum progestrone , suggesting that there was no complete consistency between these two indirect indicators of ovulation. In another study (ID. Cooke, 1972) ovulatory status of an individual patient was categorized according to histology. 84.2% of those being described as ovulatory had secretory endometrium and of those having secretary endometrium 83.9% were described as being ovulatory. On the other hand, of those having anovulatory status 50.7% had proliferative phase endometrium, where as of those having proliferative phase endometrium 66.2% were described as being anovulatory. Marcelo C. Batista et al (1992) believed that midluteal phase endometrial biopsy does not accurately predict luteal function.

3. Hormonal Study

A measurement of the hormone output of the corpus luteum is another approach for the determination of its presence and to the integrity of its function.

(a) Serum Progesterone :- A serum progesterone level of less than 3 ng/ml is consistent with follicular phase levels (Wathen NC et al, 1984). To confirm ovulation, values at the midluteal phase, just at the midpoint between ovulation and the onset of the subsequent menstrual period, should be at least 6.5 ng/ml and preferably 10 ng/ml or more. The consensus of opinion is that a single midluteal phase progesterone level is insufficient evidence to judge the adequacy of the luteal phase. The progesterone level is subject to variation with pulsatile secretion, but more

importantly, there is often poor correlation with the histologic state of the endometrium.

(b) Luteinzing hormone (LH) - Hypersecretion of luteinizing hormone as a premature surge during ovulation or tonic hypersecretion as (LH) occurs in women with polycystic ovary syndrome (PCOS) a common condition affecting both fertility and pregnancy outcome. It results in ovulation of prematurely matured egg which cannot be fertilized. LH surge from the anterior pituitary gland occurs about 24-36 hrs. prior to ovulation. Radioimmunoassays of morning sample of urine and blood give the LH result in three hours (Trousen et al). Not only the determination of LH surge helps in predicting ovulation, but the approximate time of ovulation can be guazed and coitus around this time can improve the chance of conception.

(c) Luteal phase defect - It is one of the causes of infertility in women with apparently normal ovulatory cycles (unexplained infertility). A luteal phase defect defined as a lag of more than 2 days in histologic development of endometrium compared to the day of cycle (presumably due to inadequate progesterone secretion or action), can be found in upto 30% of isolated cycles of normal women , and only if the defect is found in two cycle is it thought to be a possible factor in infertility - Approximately 3-4% of infertile women will be diagnosed as having luteal phase defect, and the incidence may be higher (approximately 5%) in women with the history of recurrent abortion (Peters At et al, 1992).

In a study when the hormonal profiles of the infertile women were compared with normal ranges, a number by endocrine anomalies could be described, viz transient hyperprotactinaemia, short luteal phases, poor follicular maturation (PFM), Poor P Surge (PPS) and elevated basal LH. Although luteal phase defect is often a direct result of decreased hormone production by the corpus luteum, the underlying causes of this dysfunction can be multiple. Decreased levels of FSH in the follicular phase of the cycle, abnormal patterns of LH secretion, decreased levels of LH and FSH at the time of ovulatory surge, or decreased response of the endometrium to progesterone have been implicated (Soules MR et al 1989).

The diagnosis should be considered in women with normal cycles and unexplained infertility, women with short luteal phases demonstrated by basal body temperature charts, and women with a history of recurrent spontaneous abortion.

In the past, the controversies surrounding the concept of luteal phase defect have revolved around issues of diagnosis, endometrial biopsy versus progesterone levels. Although measuring progesterone level have been advocated as a means of diagnosing luteal phase defect. The majority of clinical studies on this subject have used endometrial biopsy as the gold standard. The endometrium must lag behind the day of the cycle. Where as it has been common to date cycle day from the onset of the subsequent menstrual period, there is evidence that better dating can be achieved by counting forward from the LH surge (Shoupe D et al 1989, Batista MC et al 1993).

Downs and Gibson (1983) made the interesting observation that there may be degrees of luteal phase defect. In a group with a lag on biopsy of five days or more, treatment with clomiphene citrate yielded a conception rate of 79%. In contrast, in those with a less severe defect, clomiphene citrate therapy was associated with a rate of only 8.9%. Thus, with a redefinition of what constitutes luteal phase defect it may prove useful to make the diagnosis.

In common practice, again because of the discomfort and expense associated with endometrial biopsy, attention has turned to measurements of serum progesterone levels as a means of diagnosing, if not luteal phase defect, than at least a "hormone deficiency". Whereas exact normal values of, proogesterone are in some dispute, many physicians believe that a level less than 10-12 ng/ml one with prior to the onset of menstruation is a good indication of a luteal phase defect. Frequently a diagnosis of "hormone deficiency" is made based on an isolated and not always well-timed progesterone level of less than 10 ng/ml. Daily progesterone measurements taken throughout the luteal phase could provide strong evidence for luteal phase defect if the values are low, but such frequent sampling is impractical. Most important, however, is the impressive evidence documenting a lack of correlation between progesterone measurements and endometrial histology (Cooke ID et al 1972, Shepard MK et al, 1977, Rosenfield DL et al, 1980, Cumming DC et al , 1985, Soules MR et al 1989, Li T-C et al, 1989, Shoupe et al (1989) correlated histology dating with transvagianl sonography, LH surge and basal body temperature in 13 parous normal cycling women and demonstrated that

transvagianl sonography had the best correlation (96.1%). S. Vidhya et al (1994) also found that transvaginal sonography followed by premenstrual endometrial biopsy was more specific than BBT in diagnosing luteai phase defect.

Since ovulatory dysfunction is potentially treatable with good results and at lesser cost (Daly et al, 1991) it should be looked for in all cases of unexplained infertility before resorting to empirical treatment like IUI, IVF-ET.

Charla M. Blacker et al (1997) observed that women with rigorously defined unexplained infertility have subtle hormonal anomalies during the luteal phase when compared with fertile controls. Hamilton et al (1990) have described elevated FSH and Poor P. rise in women with unexplained infertility.

(d) Serum Prolactin :- The gynecoendocirne alteration in hyperprolactinemia may be attributed to a lactotropic dysfunction, generally reversible with good prospect or to a prolactemic adenoma. Prolactin excess (hyperprolactinemia) associated with hypogonadism and/or galactorrhoea, may indicate the presence of a pituitary adenoma or hypothalamic disease. Of women with amenorrhea, 10 to 4% have hyperprolactinemia, and about 30% of women with amenorrhea and galactorrhea have prolactin secreting pituitary tumors (textbook of Harrison).

The hypogonadism associated with hyperprolactinemia appears to be due to inhibition of hypothalamic release of LHRH, resulting in defective LH and FSH secretion.

4. Fern Test

Specimen of cervical mucus is obtained by platinum loop or pipette and spread on an absolutely clean glass slide and allowed to dry. When viewed under the low power microscope it shows during the oestrogenic phase, a characterstic pattern of fern formation. This ferning disappears after the 21st day of the cycle and if previously present its disappearance is presumptive evidence of corpus luteum activity. The ferning is due to the presence of sodium chloride in the mucus secreted under oestrogenic effect.

The physical character of cervical mucus also alters with the dates of cycle. At the time of ovulation cervical mucus is thin and so profuse that patient may notice a clear discharge - the so called normal ovualtion cascade. This mucus has the property of great elasticity and will stand stretching upto a distance of over 10cm. This phenomenon is called spinn barkiet or the thread test for estrogenic activity. During the secretary phase, the cervical mucus becomes more tenacious and its viscosity increased so that it loses the property of spinnbarkeit and fracture when put under tension. The observation of this change in the cervical mucus pattern in a menstrual cycle is one more piece of evidence that ovulation has occurred.

Insler devised a scoring system which took into account the various cervical mucus properties such as the amount, spinnbarkeit, ferning, viscosity and cellularity. The maximum score was fifteen and score less than 10 was considered unfavorable. The study of cervical mucus is not only a reliable method of detecting ovulation, but indicates the time of ovulation, so that therapeutic procedures can be instituted and coitus timed for optimal outcome.

5. Ultrasound

Ultrasound has become a standard procedure for monitoring maturation of a graffian follicle and in detecting imminent ovulation in in-vitro fertilization. This requires daily ultrasonic visualization of ovaries from 10th to 16th day of the menstrual cycle. It is a non-invasive and safe technique.

The major advance in the assessment of ovarian function that has occurred during the past few years is the application of ovarian ultrasonography to monitor follicular growth (Hackeloer et al 1978).

Currently, clinical diagnosis of a lutenized unruptured follicle (LUF) is made on the basis of ultrasound monitoring. The preovulatory growth of the follicle usually is normal but the follicle does not collapse following LH surge, and there may be increased growth in the luteal phase. The interior of the follicle lacks the echoes often seen in corpora lutea whereas these criteria seem straightforward, establishing the diagnosis of LUF is often difficult. Even if ultasonography is performed daily, the collapse of the

follicle can be missed, and a corpus luteum refilled with blood can be mistaken for a persistent follicle.

There are few reports of ovarian ultrasonography in the lutel phase and in general they indicate the ovarian cystic structures can no longer be clearly visualized once luteinization is will established (Hackeloer et al, 1978) However, when unexplained infertile patients were examined a number of patients were shown to have retained luteal cysts (Coutts et al, 1982) which appeared to represent failed rupture of the follicle.

6. Vaginal Cytology

A scrape preparation obtained from the upper lateral vaginal wall and examined under a microscope after staining should show cytological evidence of corpus luteum activity is taken anytime after ovulation and before next period is due. The cells are predominantly basophilic intermediate type with vesicular nuclei. They show edge curling and folding, the so called envelope effect and are clustered together. Cytology can thus provide useful evidence whether ovulation has occurred.

TEST FOR TUBAL PATENCY

Techniques for evaluation of tubal patency include tubal insufflation and hysterosalpingography. Tubal function should always be evaluated in the preovulatory phase as interference with an early fertilized ovum is avoided.

1. Tubal Insufflation Test

Rubin first introduced tubal insufflation in 1920 and he used carbon dioxide gas. He used oxygen in first 100 cases, and quickly abandoned the idea as the oxygen took 24 to 100 hours to get absorbed through peritoneum.

Confirmatory evidence of a positive patency is by auscultatory reading or pneumoperitoneum or by shoulder tip pain.

Furnish in 1921 reported a simplification of Rubin's test and suggested that the method might be still simplified by using air instead of carbon dioxide. Jacoby in 1923 was the first to report the use of air. In 40 cases Jacoby found no evidence of any serious infection, and added that there is no reason to expect infection as a result of introduction of air, since in every laparotomy case, air enters the peritoneal cavity with no untoward results. Sherman thinks that Jacoby's argument is fallacious, since in utero tubal insufflation the circumstances are very different. In the latter air is forced under positive pressure into the uterine cavity, from which it can escape out through the tiny tubal lumina and not even from there is case of non patency. According to Finn, the two prerequisites for the development of an air embolism are (1) a vessel which is in a state of incomplete collapse and (2) the introduction of air under positive pressure in the circulation.

Janson wright (1945) has shown that the solubility of niogen oxygen and carbon dioxide in millilitres per 1000 ml of blood at 38°c and 760 mg. Pressure are 1.1,2.3 and 54.1 respectively. From above points it will be

noted that the chances of gas embolism is minimum in cases of carbon dioxide because of its high affinity for the blood, Richardson in 1937 found that there was no constancy in the lethal amount of air required even in the individual of the same species. He estimated that about 500ml of air would be required to kill a human being, basing their inferences on experimental air embolism produced in small animals. Dible et al state the risk of air embolism could probably be abolished in tubal insufflation, if the amount of air were carefully measured and never allowed to exceed a total of 100 ml; and there is no doubt that several thousand insufflations with air have been performed without any ill effect of fatality by many careful investigators all over the world. But Sherman says nevertheless, the great safety of carbon dioxide makes it the gas of choice ; Furthermore precision apparatus in which the discharge of gas and the rate of flow are accurately measured, is now widely available.

Technique of Transuterine insufflation

The date should be chosen very carefully. The period should have finished at least 3 days earlier so that the mucosa has healed over completely. The procedure is usually advised 2-3 days before the probable date of ovulation because, if it is carried out later then the passage of an oocyte down the tube may be interfered with.

Some gynaecologists give sedatives and antispasmodics before attempting insufflation. The apparatus is then checked and all tubings cleared of air. The women is placed in lithotomy position. The cervix is visualized using a speculum. The vulsellum is used to catch the edge of

the cervix. The cannula is gently introduced into the uterus. With the cannula in place and the rate of flow of gas previously adjusted, the cannula is connected with the siphon meter by means of the rubber tubing and the kymograph is set in motion. The gas is passed for 3 min at a flow rate of 30 ml/min and the mounting intrauterine pressure is recorded on a specially made form fitted on the revolving drum which shows the exact relationship between the rate of flow and pressure.

Once the apparatus has been removed the patients is asked to sit up. If she has severe pain in her shoulders, she is asked to lie down again for a few minutes, so the gas can be absorbed:

Results

If one or both fallopian tubes are patent and healthy, there will be an initial rise of pressure to about to 60mmHg followed by a wave pattern "horizontal tracing" indicating tubal peristalsis. If the tubes are closed by tight adhesions, the initial pressure rise may be high (150-200 mmHg) and be followed by a smooth descending tracing indicating patency without tubal peristalsis.

Auscultation

It is preferable to use a stethoscope with two diaphragms so that the surface over both tubes can be listened at the same time. In case of stenosis a crackling sound made by small bubbles can be heard.

Finally when there is complete block, nothing is heard. The chief value of auscultation is in the diagnosis of unilateral blockage. The gas is heard to pass very well on one side and not at all on the other side.

Complications of insufflation

(a) ***Mechanical complications*** - A blocked tube may be ruptured if a pressure above 250 mmHg is allowed to develop.

(b) ***Gas embolism*** - is a further very real danger and ten fatal cases have been recorded in literature All cases occurred using air or oxygen; none with carbon dioxide. The alarm signal which consists of a small dry cough is a warning to stop the gas flowing immediately and to leave the patient lying flat for at least a quarter of an hour.

Contraindication

(1) Infection

(2) Hemorrhage.

(3) Pregnancy when suspected.

Zuow et al (1996) stated that the accuracy rate of insufflation was only 50% as compared to the rate of hydrotubation (87%) and HSG (73%). They concluded that tubal insufflation has no longer its place in tubal patency assessment due to its gross inaccuracy.

Criteria of Tubal blockage

For many years it has been widely acepted that the criteria of tubal blockage is that the gas does pass through the tube under a pressure of 200 mm Hg but Sherman has shown that gas does pass between the pressure of 200 mm Hg and he has not encountered any ill effect in his

4000 tubal insufflation. Munroker suggested that the pressure could even be raised to 250to 320 mm Hg if the patient is not anaesthetized and under anesthesia he advocates that the pressure be restricted at 200mm Hg. Sherman says "There can be little doubt that a pressure of 250 mm Hg is safe and that greater accuracy of result would be obtained if the routine upper limits of pressure were nearer to this figure. But single finding of apparent non patency, even at 250 mmHg, is not necessarily indicative of tubal occlusion. This has been proved by the subsequent occurrence of a characterstic kymorgraphic tracing of patency (corroborated by the demonstration of pneumoperitoneum or in the non anaestherized, by shoulder pain) or by hysterosalpingography.

Therapeutic possibility of tubal insufflation is good. Rubin in his series of sterility has found 16% of pregnancy after insufflation only and when no other methods were used. The cause is the reopening of the tubes if the occlusion is weak.

Sherman points out that in his series of 902 cases of primary infertility, 271 (30%) became pregnant within one year.

2. Hysterosalpingography

Pelvic inflammatory disease is unquestionably the major contributor to tubal infertility. Westrom's classic studies with Laparoscopically confirmed pelvic inflammatory disease indicated that the incidence of subsequent tubal infertility is approximately 12% after one episode of pelvic infection, 23% after two episodes, and 54% after three episodes.

The HSG is performed 2-5 days after cessation of a menstrual flow. If there is history suggestive of pelvic inflammatory disease a sedimentation rate is obtained prior to the HSG and if elevated, antibiotic therapy is given. If there is a documented history of pelvic inflammatory disease the risk of a serious reinfection following HSG is too high and it should be replaced by Laparoscopy.

Indications of HSG

(1) Two or more transuterine insufflations showing any signs suggestive of tubal abnormality.

(2) As a primary study where

(a) facilities are not available

(b) tubal insufflation cannot be performed due to inconvenience to the patients.

(3) Prior to planning of any tuboplasty operation.

(4) As an empirical measure whenever pregnancy does not eventuate within 3 months in couple in whom no cause of barreness was found with a normal Rubin test.

Procedure

After thoroughly cleaning the lower genital tract and with full aseptic precautions, a radiopaque dye is injected through the cannula into the uterine cavity under direct vision with X-ray screen. The dye should be injected slowly so that abnormalities of the uterine cavity are not missed. Usually no more than 3 to 6 ml of dye are required to fill the uterus and

tubes. If the patient complains of cramping the injection of the dye should be stopped for a few minutes and fluoroscopy temporarily discounted. Spasm is rare with ethiodol, and oil dye ; if it does occur slow injection with pauses is helpful. If the tubes fill but dye droplets do not spill from the ends of the tubes, the uterus should be pushed up in the abdomen by means of the tenaculum or suction cup. This puts the tubes on stretch and may help to release dye from the fimbriated ends. The droplets seen coming from the tube are the result of mixing of an oil dye and peritoneal fluid. On occasion, injection of dye into a hydrosalpinx will produce a similar pattern , and a delayed film to show loculation of dye is crucial in differentiating this condition from normal spill where the dye is distributed throughout the pelvis. Spring D (1980) observed that if dye does not pass into the tubes, changing the women to a prone position will sometimes facilitate passage of dye.

Anuja Dokras and Usha R. Krishna (1989) studied hysterosalpingography and laparoscopy in 85 infertility patients and found these two procedure are complementary to each other to visualize the external surface of the uterus and adnexa as well as the inside of the uterine cavity and tubes. Duingnan and Coughlan (1972) showed that the findings of laparoscopy and HSG for tubal patency matched in only 82 of 114 cases(70 %). Of these 82, HSG was superior in only 10 since it showed no spill. In Coltart's study (1970), 36 cases showed bilaeral tubal blcok on HSG. However on laparoscopy he found one or both tubes to be patent in 18 of these cases. This discrepancy could be due to spasm air bubble, or delayed evacuation of the contrast. Norman et al (1967)

advocate a repeat curettage when irregularity of the endometrium is suspected on HSG. This led to the diagnosis of early endometrial carcinoma in 3 patients under age 40 years of age with primary infertility and anovulation by Menzer J. (1980). A comparision of laparoscopy and HSG by Sheth and Krishna (1979) revealed that in 42 patients where radiological findings were completely normal, laparoscopy diagnosed genital tuberculosis in five. Lee A et al (1997) studied tubal ostial polyps in infertility patients by HSG and Hysteroscopy. The positive value of a normal HSG was 90% and he concluded that HSG was a specific but not sensitive predictor of polyp. tubal ostial polyp may occur in a significant proportion of infertility patients and can cause proximal tubal occlusion on hysterosalpingography. Rausmussen K.L. et al (1995) compared laparoscopic chromotubation of HSG in the evaluation of infertile women. The fertility prognosis obtained at HSG was different from the fertility prognosis found by laproscopic chromotubation in 34% of the women.

Timing of HSG

HSG is performed during the follicular or prolifertive phase of the cycle, after menstruation has ceased and before ovualtion has occured. This "window" between cycle days 7 and 14 is chosen to avoid potential problem. If HSG is performed after ovulation, an early fertilized oocyte might be "blown out" of the tube in retrograde fashion leading to possibility of ectopic gestation. HSG performed late in the secretary phase might dislodge secretory endometrium that is about to break down and desquamate leading to the formation of endometriosis.

Complication of HSG

(1) Mechanical complications - uterine perforation or tubal rupture. Overdistension of a hydrosalpinx can cause tubal rupture and is accompanied by significant pain.

(2) Haemorrhage.

(3) Anaphylactic shock - in patients allergic to iodine containing contrast media.

(4) Embolism - Rarely seen with an oil soluble contrast medium, intravasation has been reported to occur in 0.3% of patients.

(5) Genetic hazards - Associated with HSG are related to the irradiation encountered. No deleterious fatal effects from low doses of radiation received in pregnancy have been proven by epidemiological investigations Goldenberg et al evaluated the health of the infants of 26 women who had undergone HSG during the cycle of conception these children were all free of any congenital defects.

Contraindications to HSG

Intrauterine pregnancy when recognized is a major contraindication, nonetheless Wilson et al performed HSG during infertility investigations in 10 women who had apparently conceived finding intrauterine filling defects in two; normal term infants were delivered in all ten.

The utility of seeking serologic evidence of ***Chlamydiae trachomatis*** infection before HSG was tested in 118 infertile women. A positive correletion was found between occlusive tubal damage and serum

antibodies. Suspected sepsis occurred post HSG in five women (4%), two of whom did not have antibodies; however all had evidence of tubal damage, suggesting that the risk of infection is confined to women with existing tubal damage and is not predicted by serologic testing.

Even the accuracy of the X-ray, itself, is now in question in contrast to direct visualization with laparoscopy. One study reveals that in 17% of patients abnormalities diagnosed by HSG could not be confirmed by laparoscopy. In another study, 19% of patients with a normal HSG had pathology discovered by hysteroscopy. Other studies show the variability of range from 30-40%.

Thus HSG being less invasive is a simple outpatient procedure but can have occassional vasomotor reaction, venous intravasation or anaphylactic reaction to the contrast medium. In a study by Nunley (1987) of 593, HSGs performed with low viscosity oil based medium intravasation occurred in 41 cases and embolization in 6 cases.

TEST FOR CERVICAL FACTOR

In 1888 Marion Sims amplified the various causes for failure to find surviving sperm. In 1913, Sims-Huhner post coital test has been widely accepted as an important tool in infertility diagnosis.

1. The post coital test -

The post coital test provides information regarding both the receptivity of cervical mucus and the ability of the sperm to reach and strive in the mucus as well as the presence of any antisperm antibodies.

Estrogen levels peak just prior to ovulation ad thus provide maximum stimulation of the cervical glands. An outpouring of clear, watery mucus is fostered which may be of sufficient quantity to be noted by the woman. Earlier in the cycle , when estrogen output is lower, and starting 2 to 3 days after ovulation when progesterone levels increase and counteract the estrogen, mucus is thick, viscid and opaque.

Timing of post coital test

The spermatozoa will survive best in cervical mucus during the preovulatory phase, The post coital test is performed around the time of the expected LH surge as determined by a previous basal body temperature chart or by the length of prior cycles. Timing also can be obtained with ultrasonography and LH monitoring.

Technique and procedure

Between 2 and 8 hours after coitus, cervical mucus is removed with a nasal polyp forceps or tuberculin syringe and examined for macroscopic and microscopic characteristics.

Sperm distribution is uniform throughout the cervical canal, and selective sampling at the levels of the internal os is not necessary (Drake TS et al, 1979). It is suggested that the couple abstain from intercourse for 48 prior to the post coital test.

The stretchability (Spinnbarkeit) of the mucus at mid cycle should be 8-10 cm or more. This characteristic can be assessed as the mucus is pulled from the cervix, or alternately, by placing the mucus on a slide, covering it with a coverslip and then lifting the coverslip. At mid cycle the

mucus contain 95-98% water and should be watery, thin, clear, a cellular and abundant. When dried on a slide, it should form a distinct fern pattern.

Poor mucus at midcycle is a physical barrier that decreases sperm penetration and requires alteration to enhance fertility. In one study (Jette et al, 1972) 54% of women with good mucus became pregnant compared to 37% with poor mucus ; a statistically significant difference. Collins JA et al (1984) studied post coital test as a predictor of pregnancy among 355 infertile couples and found that pregnancy does occur even with poor mucus at ovulation time.

In addition to providing and evaluation of mucus the post coital test also gives information concerning the male. Absence of sperms requires a review of the couple's coital technique.

Cervical cultures should be obtained for *chlamyadia* if the mucus is yellowish and sperm antibody testing should be performed in cases where there are no sperms or mostly non motile sperm. In addition, sperm antibody testing is mandatory when, in a postcoital test with good mucus, the sperm are found shaking in place but not moving progressively. This shaking is a common finding in immunologic infertility.

A postcoital test cannot be considered a substitute for a semen analysis. While 21 or more sperms / HPF is almost always associated with a sperm count above 20 million/ml, the postcoital test gives little information concerning the morphology of sperm in the ejaculate. There are considerably fewer abnormal forms in the cervical mucus compared to the ejaculate. This may represent a filtering effect of the cervical mucus or

may indicate that abnormal forms do not have motility to penetrate the cervical mucus.

The postcoital test has had a role in the infertility investigation for over 100 years (Speert H, 1958). The place of the postcoital test in the infertility investigation has recently been called into question. Griffith and Grimes reviewed the literture pertaining to the postcoital test and concluded that the sensitivity (the ability of the test to detect infertility) ranged from 0.09 to 0.71 (a value of 1.00 would represent the ability to detect all cases). The specificity (ability to identify fertility) ranged from 0.62to 1.00 indicating that the test identified anywhere from 62% to 100% of fertile couples. They emphasized that the postcotial test suffers from poor validity, a lack of standard methodology , and confusion over the definition of normality.

Collins JA et al (1984) could find no difference in the subsequent pregnancy rates among groups having no sperm, no motile sperm, 1-5 motile sperm, 6-10 motile sperm, and 11 or more motile sperm. Another study (Jettle NT et al, 1972) indicated that there was a statistically significant increase in the percentage of pregnancies only when there were more than 20 sperms / HPF. Moreover, Kovacs GT et al found in a study of postcoital tests in fertile couples, 20% had either no sperm or less than one sperm/HPF.

Given the assay of negative assessment of the postcoital test what can be said in its defense beyond that it provides an opportunity to observe interaction of sperm and a product of the female reproductive tract. If the mucus is clear and abundant with good speinnbarkeit, the patient has a

better chance of pregnancy than if it is thick and sparse. If sperm are found in the mucus, it is reasonable assurance that coital technique is adequate Additional assurance is provided by the finding of motile sperm in the postcoital test. If live sperm are found in the cervical mucus, the pH is not hostile and the pregnancy rate is higher than if the sperm are all non motile. If there are more than 20 sperms/HPF, the male in all likelihood, has a sperm count above 20 million/ml and the couple has a significantly better chance for pregnancy than if the postcoital test contain fewer than 20 sperm/HPF. A poor result in the postcoital test can raise a suspicion of an immunologic problem.

2. Antisperm antibody testing

Unexpalined infertility account for 10% of the infertile population. In sensitized female, spermatozoa may be unable to punctuate cervical mucus or become agglutinated or immobilized during sperm transport. Increasing evidence is in favour of presence of local immune response offered by the cervix, which is most accessible and potentially important site of local immune response to sperms (Ingessler, 1981). Detection of local immunity to sperm is definitely of greater importance than demonstration of systemic immunity. Human cervical mucus contians secretory IgA, IgG.

The concentration of immunoglobulin in cervical secretions during the estrous cycles is such that the relative concentration of IgA increases at ovulation and in the post ovulatory period (Schumacher, 1970). IgG may be detected by immunoflorescence in the plasma cells of the cervical

mucosa in cases of infertility. Thus local immunological responses in the genital tact of women may occur (Lippes et al 1970 ; Masson et al 1969 Hulka and Omran, 1969).

Another study carried out by Poonam Gupta et al to elicit the presence of antisperm antibodies in the sera, cervical mucus and semen of thirty couples suffering from infertility of unexplained origin, antisperm antibodies were detected by sperm immobilization test (S.I.T.) and indirect immunoflorescent techniques (IFT). The S.I.T. was positive in 40% of wives serum, 33% of husbands serum and 23.3% of cervical mucus samples. No definite correlation was observed between S.I.T. and I.F.T.

Meenakshi et al (1985) found antisperm antibody activity in 6% cases in serum, cervical mucus. Israelstram (1969) has also reported the incidence of antisperm antibody as 7%. Silvaraman et al (1988) detected antisperm antibodies in 8.75% of infertile women. Soffler and Marus (1976) postualted that serum antibody activity in cervix is more important than of serum as the former has a more direct effect on spermatozoal penetration.

HYSTEROSCOPY

The hysteroscope is good for differentiating between endometrial polyps and submucous leiomyomas, establishing the definitive diagnosis and treatment of intrauterine adhesions, and for the diagnosis and treatment of intrauterine congenital anomalies. One can argue from a cost effective point of view that HSG is a more useful screening procedure, and the hysteroscope should be reserved to pursue abnormalities identified on the hysterogram.

Indication for Hysteroscopy in infertile patient.

(1) Infertility associated with abnormal uterine bleeding.

(2) History of complicated intrauterine procedure of uterine surgery in the past.

(3) Abnormalities of the uterine cavity or interauterine filling defects on HSG.

(4) Infertility with unknown cause.

(5) Cases with previous history of PID or Koch's.

(6) Before any attempts with an ART programme.

(7) Together with laparoscopy if hysteroscopy has never been performed earlier.

(8) Infertility associated with repeated early pregnancy wastage.

Uterine factors may directly and indirectly account for reproductive failures in 15-59% of cases (Lindmann et mohr 1977). The time honoured and traditional method of studying uterine factors has been HSG. Diagnostic laparoscopy has established its superiority over HSG in studying tubal factors. The main draw back of diagnostic laproscopy is its failure to visualize the interior or uterine cavity. This has been overcome by hysteroscopy.

While some considered hysteroscopy to be superior (Kessier and Lonet, 1996) other do not find it to be of much value (Snowden et al 1984). Others have adopted a unifying approach to consider the two procedures

complimentary (Fayez et al 1986). In a study (Chitra Raghunandan et al 1994). Interauterine pathology was detected in 45% by hysteroscopy. Various workers have reported uterine abnormality to be ranging from 41.2% (Cohen 7 Dmowshi, 1973) to 59% (Lind man and Mohr 1977). Woolcott R et al (1995) agrees that in infertile women the use of hysteroscopy is supported as a part of comprehensive assessment of female reproductive anatomy.

Wang Y et al (1992) analysed 90 cases of infertility and habitual abortion by the hysteroscopy and HSG. The results of HSG corresponded with that of hysteroscopy in 52.5%. The diagnosis of adhesion and polyps of the uterine cavity was made accurately by hysteroscopy and both would be operated under hysteroscopy concluding that hysteroscopy is more important than ultrasound and HSG in the examination and treatment of infertility.

LAPAROSCOPY

Laparoscopy is the final diagnostic procedure of any infertility investigation. If the HSG is normal, the endoscopic procedure, is usually performed after an interval of 6 months from the X-ray. This allows time for the fertility enhancing effect of the X-ray procedure. An exception would be made for the woman who is at high risk for pelvic infection or the older major abnormalities, laparoscopy should be done without delay. The findings at laparoscopy agree with those of HSG in approximately two thirds of the cases. The major area of disagreement is the failure of the HSG to detect pelvic adhesions or endometriosis. Approximately 50% of

patients undergoing laparoscopy will have pelvic pathology, usually endometriosis of pelvic adhesions.

Laparoscopy is invasive and require general anaesthesia but has the advantage of simultaneous operative procedures such as adhesinolysis and the advantage of visualising the adnexa to rule out genital tuberculosis which is an important cause of infertility is our country. In a laparoscopic study by Deshmukh and Lopez (1987) they showed the highest incidence of genital tuberculosis was in the years age group.

Laparoscopy helps to diagnose genital tuberculosis prior to development of symptoms and before irreversible damage to the fallopian tubes occur. A comparison of laparoscopy and HSG by Sheth and Krishna (1979) revealed that in 42 patients where radiological findings were completely normal, laparoscopy diagnosed genital tuberculosis in five.

PID and its sequelae are responsible in 40% women with infertility. Laparoscopy has been found to be a superior method of bacteriological sampling since samples collected by cervical swab and culdocentesis do not always correlate and since laparoscopic collection is done under direct vision, thus simultaneously providing visual grading of severity of the disease (Sweet et al, 1979) ; (Wonlner - Hanssen et al, 1983). Serological techniques do not always differentiate between pelvic and extra pelvic infections and also, not always, between current and past infections (Hoyme1990).

El-yahia Aw (1994) evaluated 130 apparently normal infertile women laparoscopically. Overall 75 (57.7%) patients were found to have evidence

of pelvic disease while the remainder were completely normal. Pelvic endometrosis was the most common pathology accounting for 27.7%, pelvic adhesions 20.8% and mild pelvic inflammatory disease 6.2%. Appropriate treatment of the pelvic conditions resulted in 31 (42.5%) pregnancies compared with 7 (12.3%) pregnancies in the no treatment group. The outcome of this study suggests that additional pregnancies do occur as a direct result of laparoscopic examination and subsequent therapy. Yahia Aw believes that laparoscopy should be performed in all women to search for a tubal or pelvic cause of infertility when all other examinations have been normal. Laparoscopy examination is a valuable procedure for the etiological diagnosis of tubal infertility (Yang Y et al 1996). They studied 1120 cases with proven tubal infertility laparoscopically. Tubal infertility diagnosed by laparoscopy accounted for 32.8% of infertile patients. Among them, pelvic tuberculosis occupied 63.3%, while nonspecific inflammatory disease (NSID) 36.4%, 44.8% of the tuberculosis and 62.2% of NSID group had negative findings during pelvic examination.

Therefore in our country where tuberculosis is so common laparoscopy must be considered in every infertile female having chronic inflammatory disease.

Vasiljen et al (1996) recommend both HSG and laparoscopy for the identification of tubal , uterine and ovarian factors in infertile female.

MRI

With T2 weighted pulse sequences, uterine zonal anatomy can be clearly delineated, and with images obtained in a plane coronal and perpendicular to the long axis of the uterus, the external uterine contour can be evaluated.. Although the use of MRI is not indicated in every evaluation, the modality is valuable in certain setting, especially those that involve differentiation of congenital anomalies and localization of leiomyomas. In these setting, use of MRI can obviate more invasive procedure, such as laparoscopy (Woodward PJ et al, 1993).

Material & Methods

MATERIAL AND METHODS

The present study was carried out in MLB Medical college, Jhansi, in the Reproductive Medicine Clinic under medicine department. The cases were selected from those attending the infertility clinic. Forty one cases of primary infertility and ten cases of secondary infertility were included in the study.

Criteria for selection of cases:-

The criteria for primary infertility was that the lady must have been married for at least 1 year, and staying with her husband for the same duration. They should not have used any contraceptive device during this period. The women should be in the reproductive age group. The criteria for secondary infertility was that the female must have conceived at least once in the past. (Irrespective of wether it was carried to term or not)

PHYSICAL EXAMINATOIN AND HISTORY OF THE MALE PARTNER

A detailed history and complete examination of the male partner in infertility is essential to rule out its possible role in the infertile couple and is a special pre-requisite before implicating the female factor as the sole cause of infertility. After having ruled out the possibility of male infertility, the female was examined.

PHYSICAL EXAMINATION AND HISTORY OF THE FEMALE PARTNER

A thorough history and complete physical examination was carried out. General particulars- Name, age, occupation, religion, caste, address and other relevant details were noted.

Personal history:-

A relevant personal history with emphasis on the socio-economic status was obtained. A comprehensive history with regards to the duration of stay together, number of coitus performed per week, the use of any form of contraception, any form of psychosexual disturbance, tuberculosis, addiction and occupation was also recorded in each case. Females were asked with particular reference to dyspareunia and history of injury or operation of the genital tract, mumps, chronic illness, other viral fevers and venereal diseases.

Family History :-

Of infertility, venereal diseases, tuberculosis , diabetes and hypertension were included in the questionnaire.

Obstetrical History :-

In the case of secondary infertility, the history of previous abortion, miscarriages and intra-uterine death were considered. A detailed account of the nature and mode of the previous labour was taken, with special emphasis on the puerperal period with regard to puerperal sepsis.

Menstrual History

This was studied in detail as follows :-

Menarche

The age of the menarche was asked to find out if it was established later or at the normal age.

Enquiries were made about the regularity, any previous irregularities, amount and duration of blood loss, passage of clots and of any period of

amenorhoea or oligomenorrhoea and presence or absence of dymenorrhoea and its type were noted, any discharge P/V.

Marital History

The age of the patients at time of marriage, the frequency of intercourse were also enquired into.

Dyspareunia

The patient was asked about the nature, whether it was superficial or deep.

Clinical Examination

Having taken the detailed history, a thorough clinical examination of the female was carried out on the following lines-

General Examination -

The general body built, pulse, blood pressure, body weight were recorded in each case. The patient was also examined for pallor, icterus, clubbing, cyanosis, edema, fever and lymphadenopathy. Cardiovascular and respiratory system, thyroid and breasts were examined for any abnormalities.

A thorough clinical evaluation was then undertaken for any gross pelvic factors, to exclude it as a possible cause for infertility .

Genital examination -

Inspection

of vulva, vagina and urethra for any evidence of growth, infection, congenital anomaly, lesion or discharge.

Per vaginum (P/V) Examination

The patient was asked to empty her bladder immediately before vaginal examination. It was carried out in good light using sterile gloves to prevent the spread of infection from one patient to another.

The following points were carefully noted -

1- The state of the hymen.

2- If the introitus was normal, tight or lax.

3- For any evidence of vaginismus.

4- Fornices - whether short, long or normal.

5- Texture of cervix, whether bleeds on touch.

6- Direction in which cervix in pointing.

7- Approximate size and position of the uterus.

8- Its consistency and whether it was shifted to any side.

9- The fornices were also examined to detect the presence of inflamed tube or ovary, Pelvic cellulitis or any other tumor.

Per Speculum Examination

was done and the following factors were especially noted-

a. Shape of the cervix-normal or conical.

b. Shape of the os-normal or pinhole.

c. Presence of any erosion.

d. Presence and nature of discharge.

Each patient was examined three times in each menstrual cycle-

1. In the post menstrual phase.

2. In the ovulatory phase.

3. In the pre-menstrual phase.

All the patients attending the infertility clinic were asked to maintain their basal body temperature charts to find out the approximate time of ovulation, so that the Sim's Huhner test could be performed under optimal conditions. A premenstrual endometrial biopsy and post menstrual tubal testing was done in each patient, to find out the tubal, ovarian and fundal factors in infertility.

Method

The following instruments were required-

1. Sim's speculum.
2. Anterior vaginal wall retractor.
3. Vulsellum.
4. Uterine sound.
5. Endometrial biopsy curette.
6. Tubal testing cannula and apparatus.
7. Suction cannula.
8. Swab sticks.
9. Sinus forceps.
10. Slides
11. Cover Slips
12. Ruler
13. Microscope
14. Stethoscope
15. Dilators

TEST PERFORMED IN POST-MINSTRUAL PHASE

1. Tubal Insufflation test
2. Hysterosalpingography

1. Tubal Insufflation test (Rubins test)

A simple apparatus consists of-

a. Uterine cannula with adjustable rubber cork.

b Rubber tubing connected to manometer and to the bulb of the cannula .

Technique -

1. The patient is placed in lithotomy position and cervix is exposed by means of bivalve speculum.
2. After the cervix was visualized, it was caught with the vulsellum, the tubal testing cannula was passed inside the cervical canal, the rubber cork fitting the external os.
3. The vagina was filled with saline to know the back escape of air.
4. The rubber bulb was then squeezed slowly and steadily, and the manoneter was watched, which rose slowly to 80 to 100 mmHg and dropped suddenly to 40 to 50 mmHg where it remained steady.
5. An assistant heard the escape of the air via the fallopian tubes if tubes were patent by placing a stethoscope over the mid-inguinal point. The escaping air was heard as a bubbling noise if the tubes were patent, and the patients also complained of shoulder tip pain. If the tubes were blocked, as the pressure began rise, the patient complained of pain, and no escape of air could be heard by the

stethosope even up to 180 mmHg and the manometer was not increased further.

Contraindications for tubal patency test -

1. During pre-menstrual and menstrual phases, and after curettage or endometrial biopsy.
2. Acute or chronic pelvic infection.
3. Purulent vaginal discharge.
4. Cervical erosion.
5. Serious heart or lung disease.

2. Hyterosalpingography (HSG) :-

This was done in the department of Radiology in M.L.B. Medical College, Jhansi. If the tubes were found to the blocked by tubal insufflation test, HSG was done as a confirmatory test.

This was done between the 5 and 10 day of menstruation. Dye used to visualize the uterus and its appendages was trazograph. The patient was called on that day and atropine 1/2 ampoule was injected half an hour before the injection of the dye. After half an hour the patient was put on the X-ray table in lithotomy position. Sims speculum applied, acriflavine lotion painted to the vaginal wall and the cervical mouth, the anterior lip of the cervix was caught with a vulsellum. The nozzle of the syringe, in which the dye was drawn, was introduced into the external os and the dye was injected under screen. This method of viewing under the screen was taken, first, to see the peristalsis of the tube and second, to push the fluid under a guided pressure and third, to see either the peritoneal spill or any tubal blockage. At proper time, i.e. either at the site of blockage or when the full

view of the uterine cavity with peritoneal spill was visualized, a picture was taken after an hour and at times a third picture was taken after three hours when there was any doubt regarding the peritoneal spill in the first and the second picture.

Complications of HSG

a. Pelvic infection

b. Pain and collapse which can, however, be avoided by injecting atropine half an hour before the procedure.

c. Allergic reactions.

Hysterosalpingography should not be performed -

a. In the post-ovulatory period lest an early pregnancy is disturbed.

b. In the presence of genital infection and

c. If the patient is sensitive to iodine

TEST CARRIED OUT IN PRE-MENSTRUAL PHASE -

1. Endometrial biopsy -

The cervix is exposed by inserting the Sim's speculum and anterior vaginal wall retractors and is caught with the vulsellum. The endometrial biopsy currete is then introduced and the uterine endometrium is scraped systematically in a clock wise direction till a gritting sound is heard. The currette material is collected in a formalin filled vial and sent to the pathology department for section, staining and studying the different phases and characters of the tissue. This study was carried out mainly with the object of differentiating the proliferative and secretory stages of the endometrium.

2. Serum Progesterone-

Serum progesterone is estimated in the presumptive luteal phase of the cycle among regularly menstruating women and values in excess of 15 nmol/L is regarded as evidence of ovulation.

Similarly a secretory endometrial biopsy performed during the presumptive luteal phase is considered evidence of ovulation.

TEST PERFORMED DURING OVULATORY PHASE -

1. Cervical Mucus Examination

The approximate time of ovulation was judged by asking the patient to maintain her basal body temperature chart, which presents an ovulatory dip dollowed by rise, and to come on the 12-14 day of her cycle. The cervical mucus was collected as follows -

a. A dry speculum was inserted and cervix was exposed.

b. Drop of material from the posterior fornix was removed and placed on a slide marked "V" and examined microscopically.

c. Gently remove the secretions covering the cervix with cotton.

d. The mucus was then aspirated from the upper cervical canal, and placed on a slide marked "C". The quantity, colour and consistency of the mucus was noted in each case. The mucus was collected by a suction cannula, or sinus forceps if the mucus was thick and tenacious, and also depending upon the accessibility, size and calibre of the cervical canal. It was immediately covered with a cover slip and examined under low and high power of the microscope. It was stained to find the number of leukocytes per high power field.

Precautions -

a. Bloody mucus was avoided by gentle handling, as specimen becomes unreliable.

b. The slide specimens were examined immediately.

2. Sims-Huhner Test -

The collection of specimen was carried out as mentioned above after instructing the patients to observe certain rules.

Instructions to Patients :-

1. Couple is advised intercourse close to ovulation time preferably in the early hours of morning.
2. No intercourse for 3-5 days beforehand.
3. No pre-coital lubricants.
4. To lie on her back following intercourse with hips elevated by a pillow for 30-60 minute.
5. No post-coital douches
6. To report for the test within 2-8 hours after intercourse, the earlier the better.
7. The cervical mucus is aspirated from the cervix and spread over a glass slide. Another smear from the posterior fornix serves as control.

The number of actively motile, sluggish or dead sperms per high power field were noted. At the same time presence of antisperm antibodies were detected which imparts shaky or rotatory movements to the sperms or may totally immobilize them instead of progressive movements of the sperm .

OBSERVATIONS

OBSERVATION

A total of fifty one couples were studied from the patients attending the reproductive medicine clinic in the medicine department. Out of them. 40 females were found to have some defect in their reproductive system which could be responsible for infertility.

The patients were studied according to the following headings -

1. Age.
2. Duration of marriage.
3. Type of infertility.
4. Religion.
5. Occupation.
6. Socio economic status
7. Rural and Urban
8. Marital History.
9. Symptoms.
10. Menstrual History.
11. Age of Menarche
12. Past history of any illness or treatment.
13. Family history of infertility.
14. Findings in various investigations.

1. AGE -

Table 1 presents the distribution of cases according to age group.

TABLE 1

DISTRIBUTION OF CASES ACCORDING TO AGE GROUP

Age in Years	Infertility patients	
	No. of cases	Percentage
< 20	3	5.8%
21 - 25	22	43.13%
26 - 30	18	35.29%
31 - 35	7	13.72%
> 36	1	1.96%

The maximum number of cases 22 (43.13%) were present between 21-25 years of age followed by 18 cases (35.29%) between 26-30 yrs, 7 cases (13.72%) were present in 31-35 years, 3 cases (5.8%) were below 20 yrs of age and only 1 (1.96%) was seen in the age group more 36 yrs.

2. DURATION OF INFERTILITY -

Table - 2 presents the distribution of cases according to duration of infertility.

Age in Years

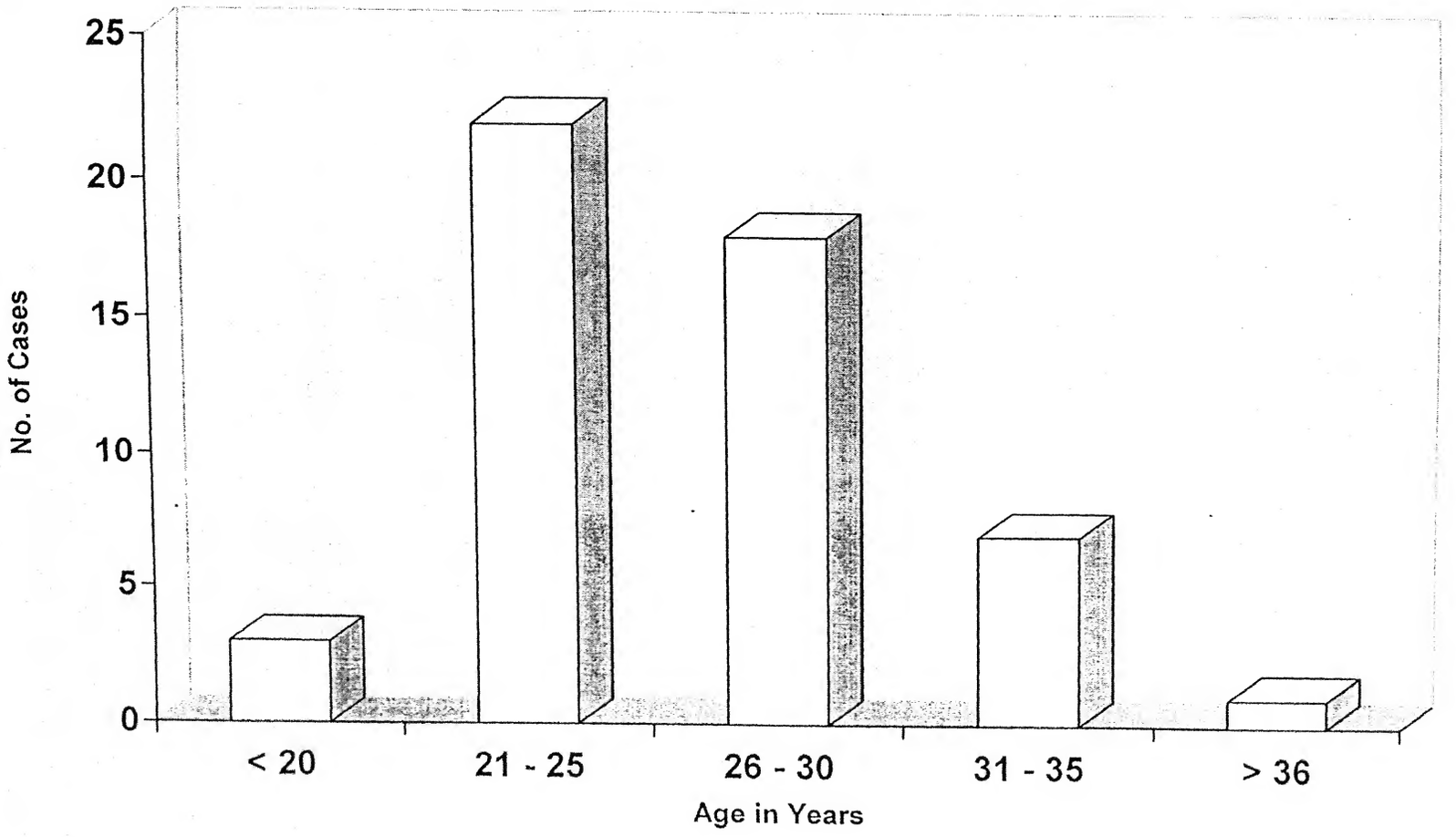


TABLE 2

DISTRIBUTION OF CASES ACCORDING TO DURATION OF INFERTILITY

Duration in Years	Infertility patients	
	No. of cases	Percentage
< 2	1	1.96%
2 - 4	12	23.52%
5 - 7	15	29.41%
8 - 10	10	19.52%
> 10	13	25.49%

Out of the 51 couples, 15 couples (29.41%) were infertile for the duration of 5-7 yrs, 13 couples (25.49%) were infertile for the duration >10 yrs , 12 couples (23.52%). were infertile for the duration 2-4 yrs , 10 couples (19.52%). reported after 8-10 yrs of infertility, 1 couple (1.96%) reported within 2 years of marriage.

3. TYPE OF INFERTILITY -

Categorizing infertile patient into primary and secondary is significant as the causes of infertility in both group may be different.

Table - 3 : presents the distribution of cases according to the type of infertility.

DURATION OF INFERTILITY

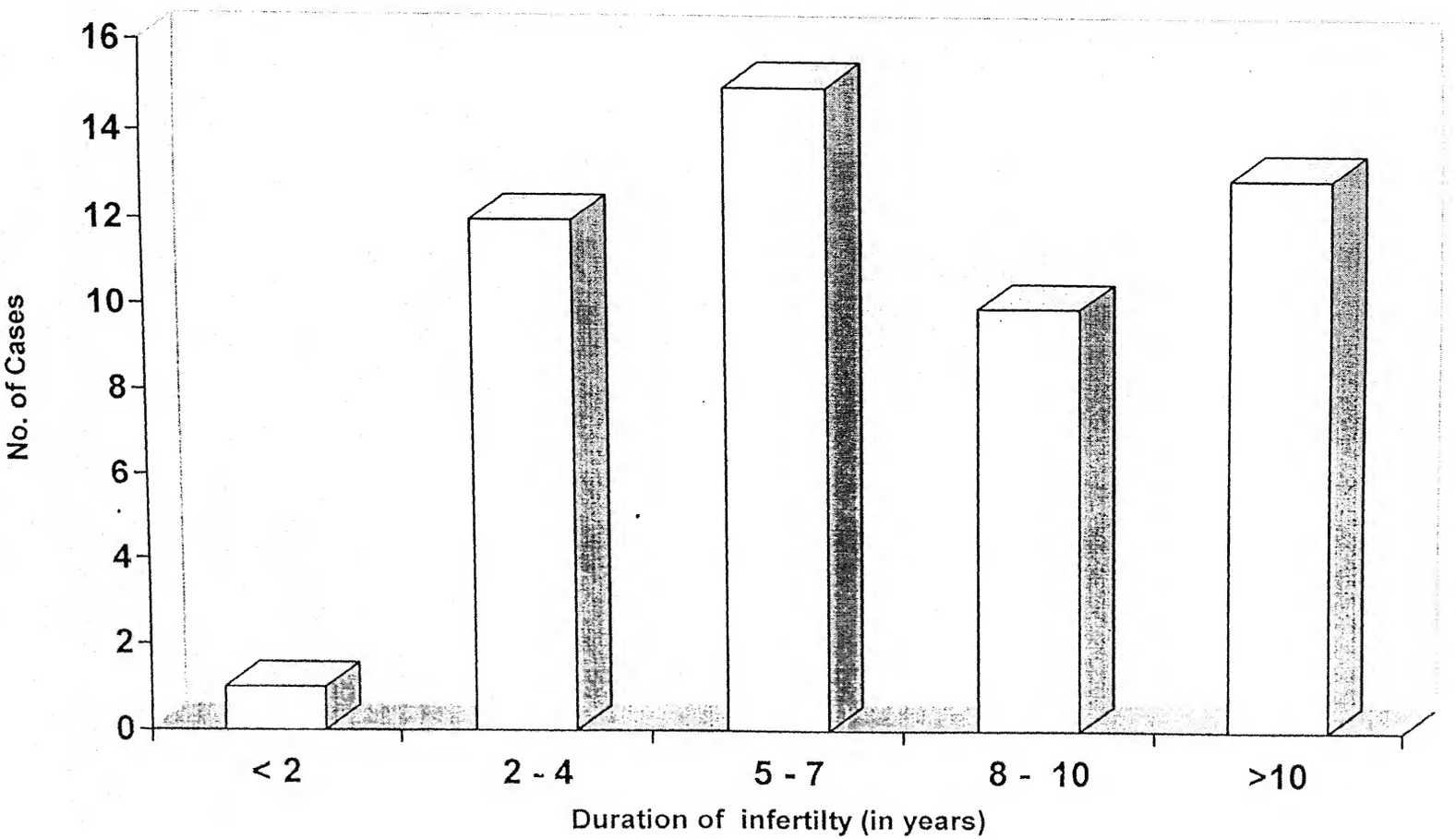


TABLE 3

DISTRIBUTION OF CASES ACCORDING TO THE TYPE OF INFERTILITY

Type of Infertility	Total No. of Cases	Percentage
Primary	41	80.39%
Secondary	10	19.6%

Out of total 51 cases, maximum number 41 (80.39%) of cases were of primary infertility. Only 10 cases (19.6%) were of secondary infertility.

4. RELIGION -

46 couples (90.2%) were from the Hindu community. The remaining 5 couples (9.8%) were from the Muslim community, None of them were from Christian community.

5. OCCUPATION -

Most of them were housewives, 2 were schoolteachers not exposed to professional hazards and to any noxious agents.

6. SOCIO ECONOMIC STATUS -

Most of the patients belonged to the low socio economic status, which may be due to the fact that they were selected from hospital out patient department and moreover Bundelkhand is a poverty stricken region.

Table 4 presents distribution of cases according to socio economic status.

TYPE OF INFERTILITY

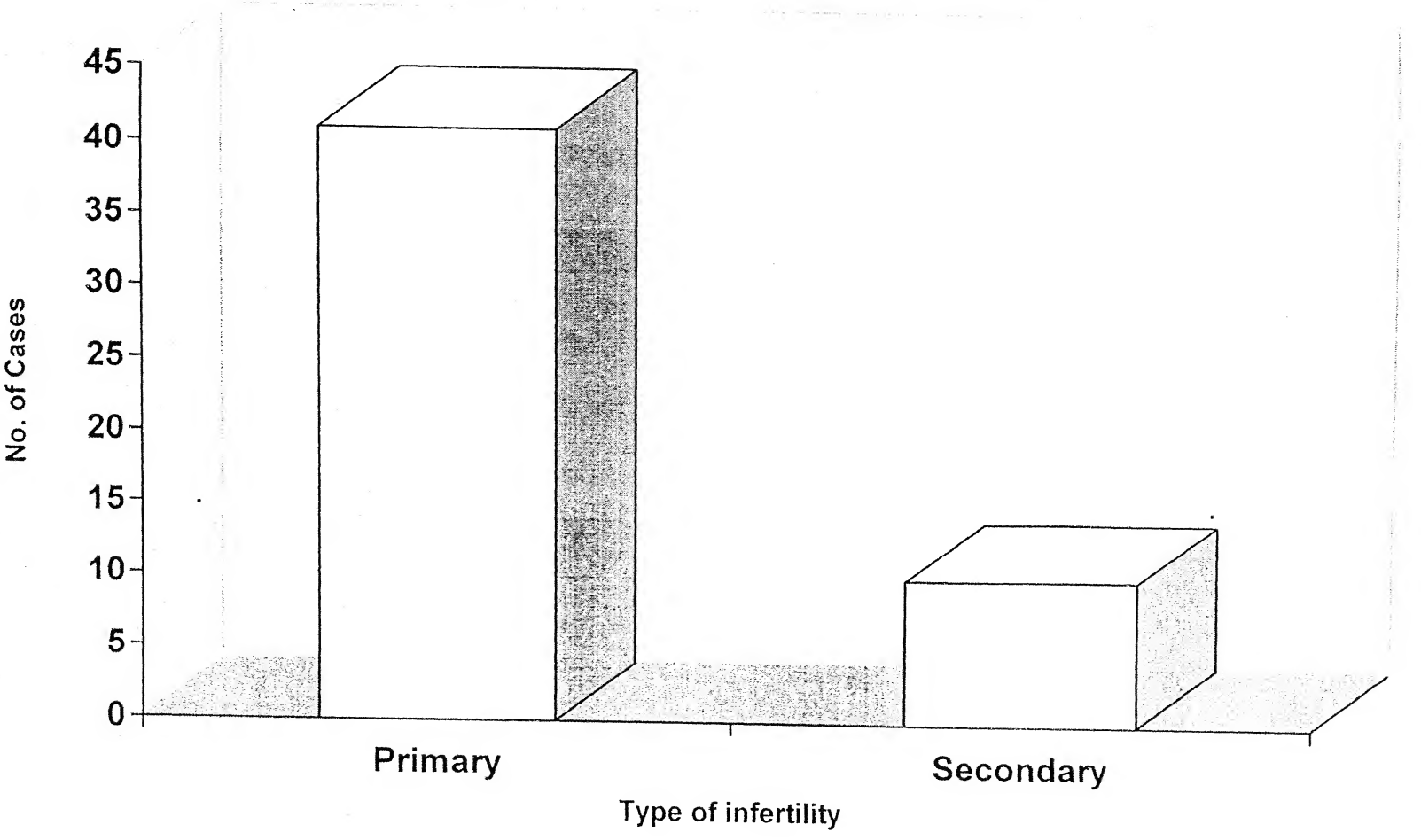


TABLE 4

DISTRIBUTION OF CASES ACCORDING TO SOCIO ECONOMIC STATUS

Socio Economic Status	Infertility patients	
	No. of cases	Percentage
Low	38	74.5%
Middle	13	25.49%
High	-	-

Out of 51 patients, 38 cases (74.5%) were from low socio economic status and 13 cases (25.49%) were from middle socio economic status. There were no cases from high socio-economic status.

7. RURAL OR URBAN -

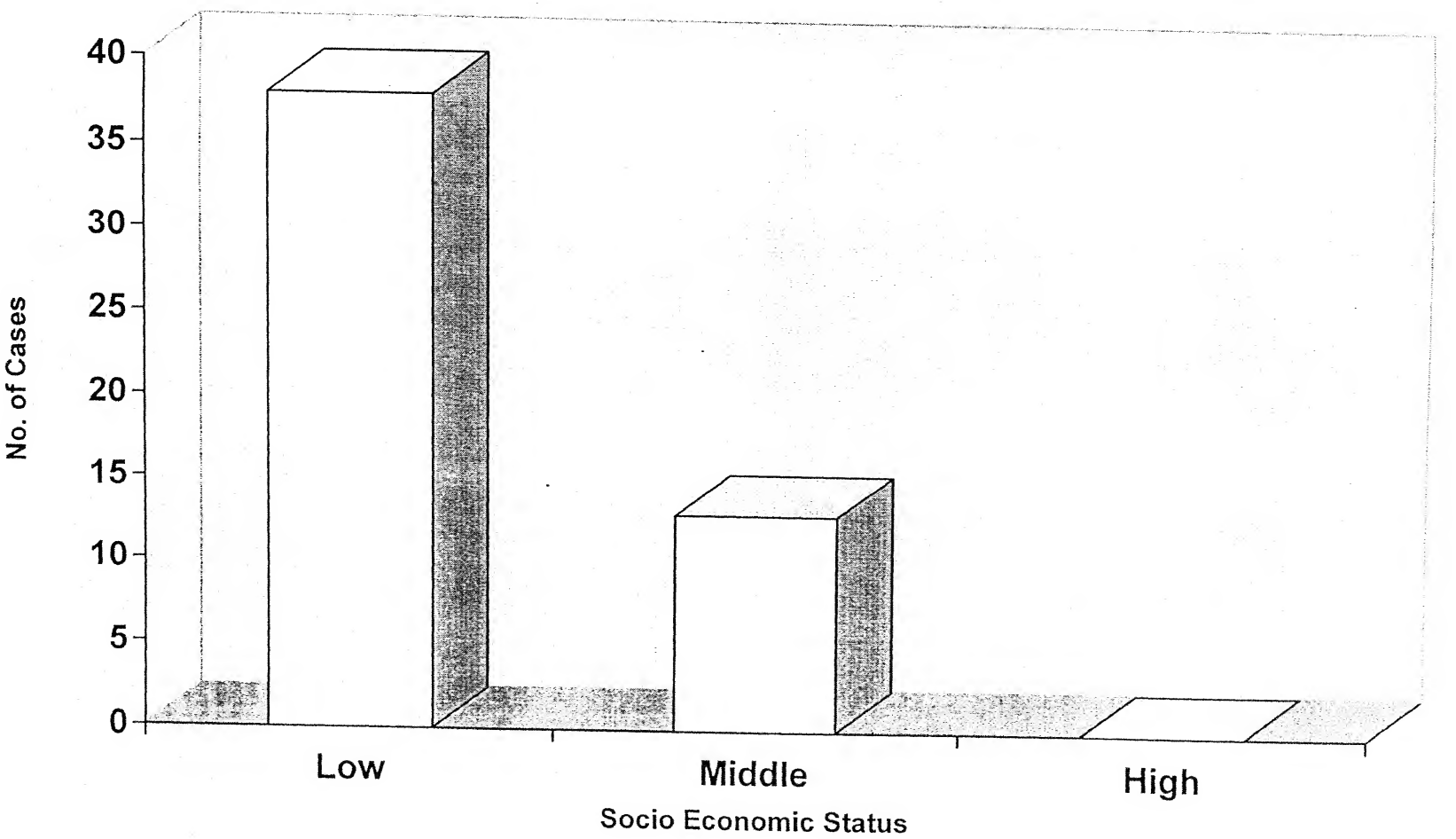
TABLE 5

PRESENT DISTRIBUTION OF CASES ACCORDING TO URBAN OR RURAL AREAS

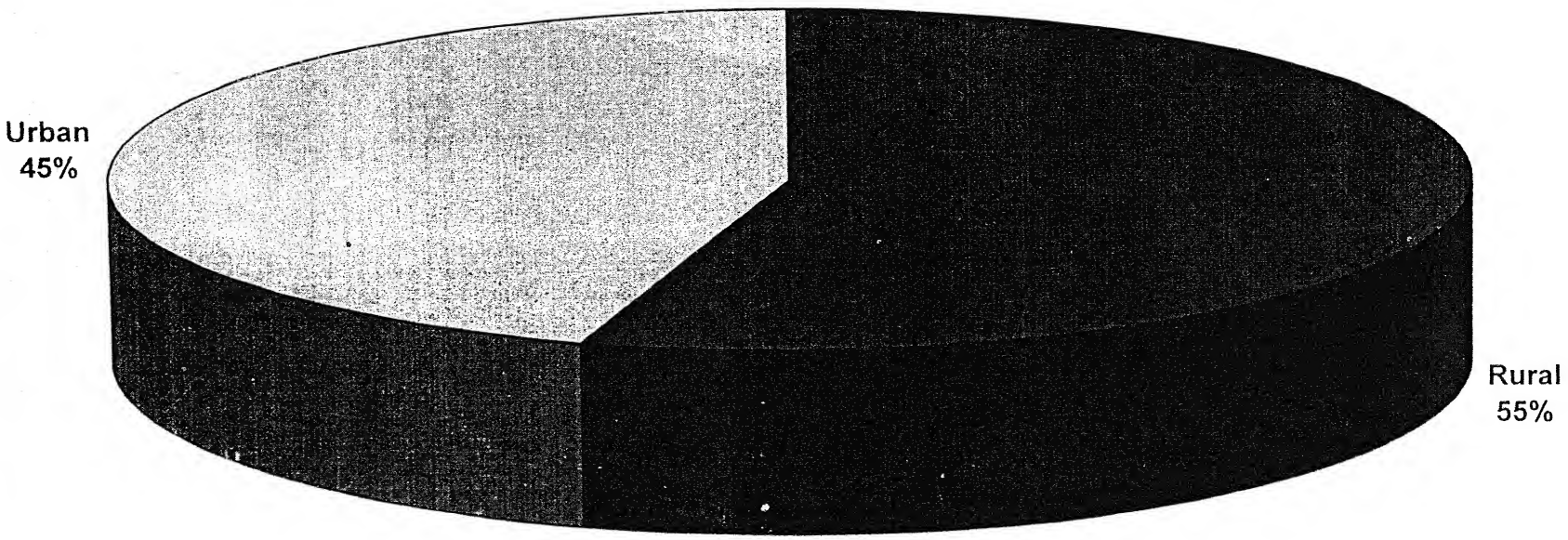
Locality	Infertility patients	
	No. of cases	Percentage
Rural	28	54.9%
Urban	23	45.09%

Table 5 shows that 54.9% cases were from rural areas and 45.09% of cases from urban areas.

SOCIO ECONOMIC STATUS



LOCALITY



8. MARITAL HISTORY -

Table 6 presents the distribution of cases according to age at marriage.

TABLE 6

DISTRIBUTION OF CASES ACCORDING TO AGE AT MARRIAGE

Age at Marriage in years	Infertility patients	
	No. of cases	Percentage
12 - 15	17	33.33%
16 - 19	21	41.17 %
20 - 23	11	21.57 %
24 - 27	2	3.9%
> 28	-	-

The commonest age at marriage was between 16 - 19 years with 21 cases (41.17%) in this group, the next being in 12-15 years group - there were 17 cases (33.33%). There were 11 cases (21.57%) in the age group 20-23 years and 2 cases (3.9%) in the age group 24-27 years with none being married after 28 years of age and before 12 years of age.

9. SYMPTOMATOLOGY -

Table 7 presents the distribution of cases according to the presenting Complaint.

AGE AT MARRIAGE

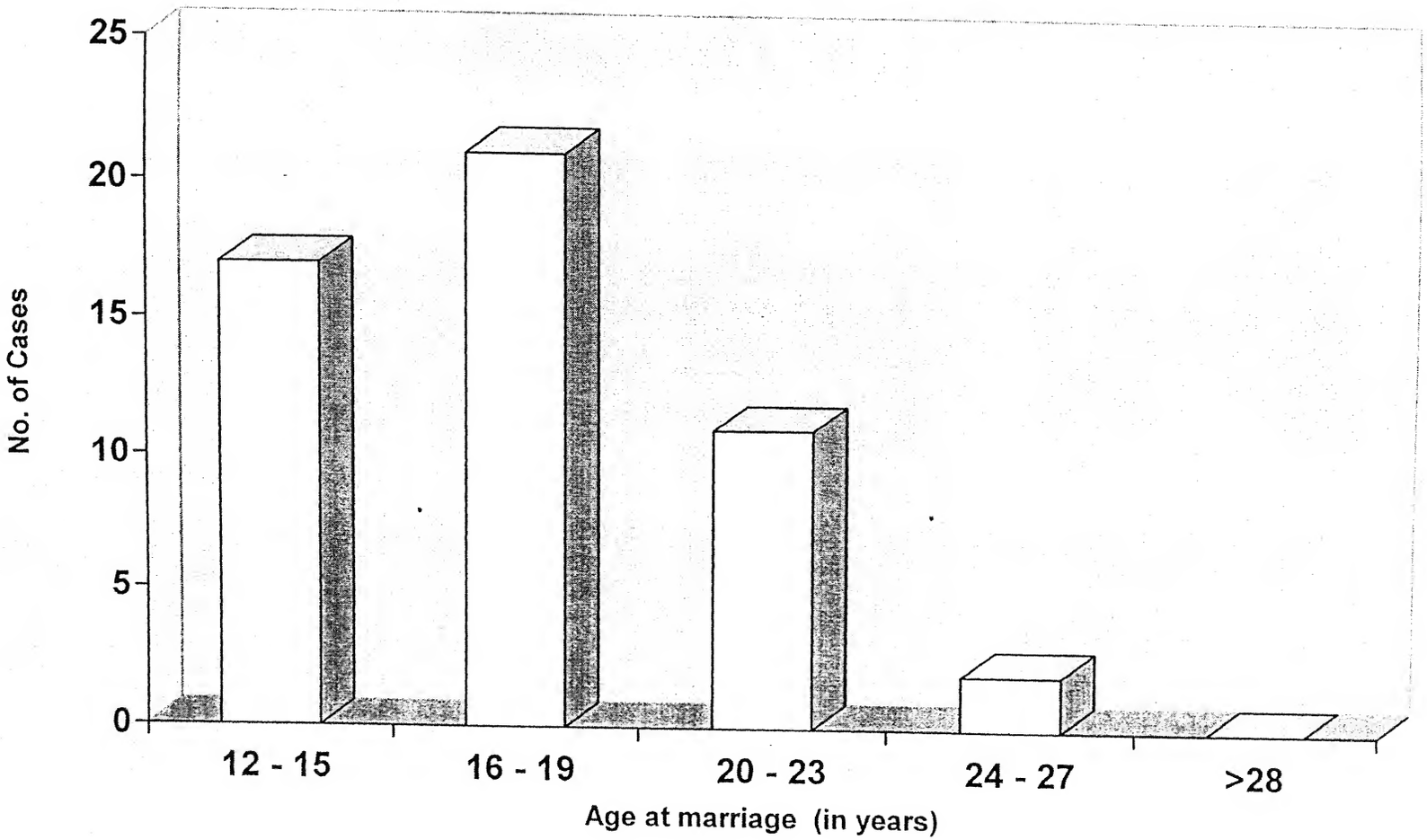


TABLE 7

DISTRIBUTION OF CASES ACCORDING TO THE PRESENTING COMPLAINT.

Presenting Complaint	Infertility patients	
	No. of cases	Percentage
1. No Symptoms	11	21.56%
2. Pain in abdomen	10	19.6%
3. Leucorrhoea	16	31.37%
4. Backache	13	25.5%
5. Dyspareunia	5	9.8%
6. Dysuria	5	9.8%

It is obvious that the most common complaint was leucorrhoea in 16 (31.37%) closely followed by the complaint of backache in 13 (25.5%). 11 (21.56%) came because of the desire to conceive without any symptoms. Pain in abdomen was present in 10 females (19.6%). Complaints of dysuria and dyspareunia were less compared to other complaints (9.8%) each.

10. MENSTRUAL DISORDERS -

Table 8 presents the distribution of cases according to menstrual Disorders.

SYMPTOMATOLOGY

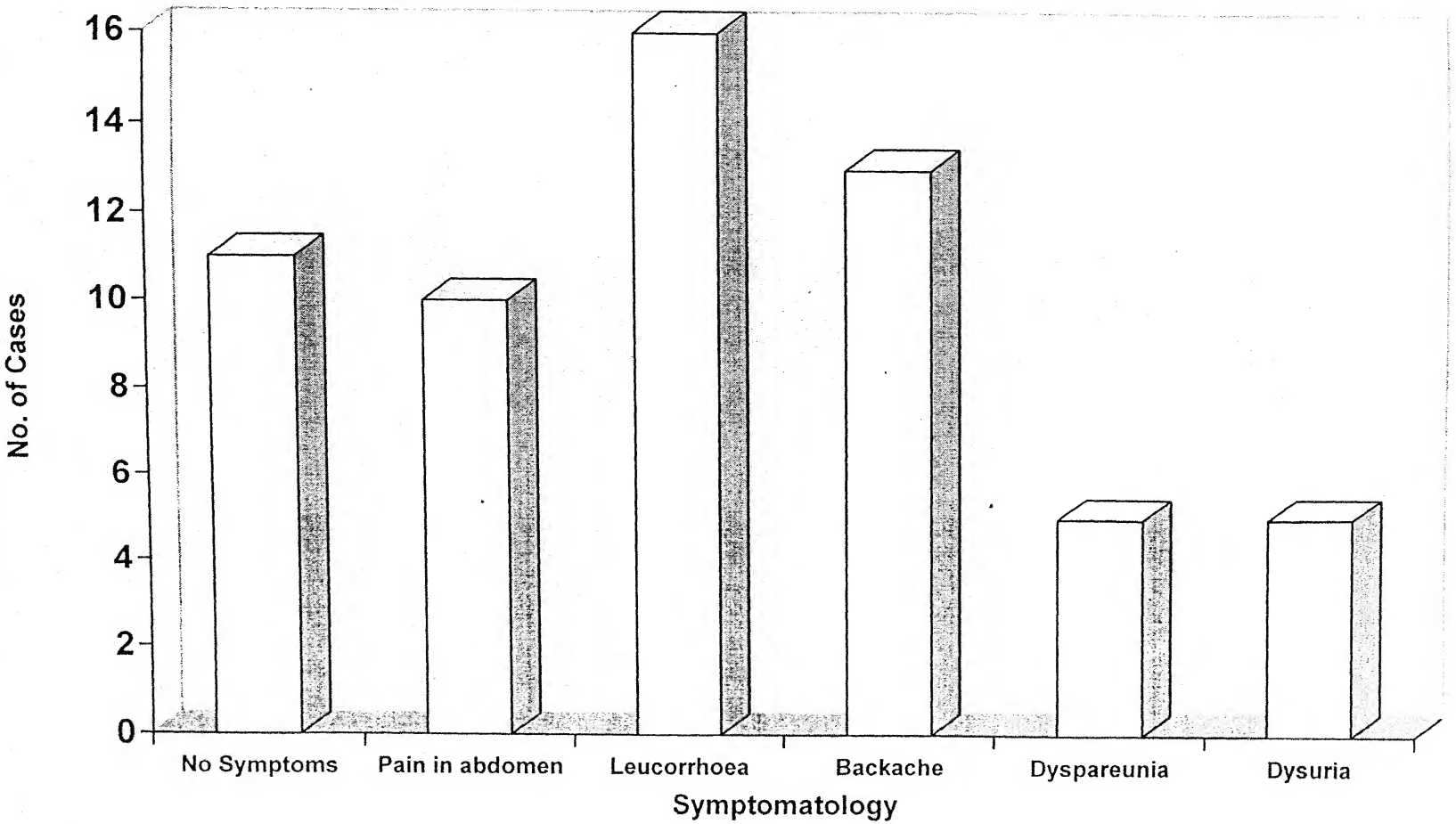


TABLE 8

DISTRIBUTION OF CASES ACCORDING TO THE MENSTRUAL DISORDERS.

Menstrual Disorders	Infertility patients	
	No. of cases	Percentage
Normal Menses	30	58.82 %
Menorrhagia	8	15.68 %
Polymenorrhoea	5	9.8 %
Oligomenorhoea	2	3.9 %
Dysmenorrhoea	10	19.6 %
Secondary Amenorrhoea	1	1.96 %
Delayed Cycle.	4	7.84 %

The above table shows that maximum females (58.82%) had normal menses. The commonest menstrual disorder was dysmenorhoea in 10 (19.6%) followed by menorrhagia in 8 (15.68%).

Poymenorrhoea in 5 (9.8%) females followed by delayed cycles in 4 (7.84%), oligomenorrhoea in 2 (3.9%) and secondary amennorrhoea in 1 (1.96%) was found .

11. AGE OF MENARCHE -

Menarche is the time of onset of menstruation which varies with race and family, but the average for most girls is from twelve to thirteen years of age.

Table 9 presents the distribution of cases according to age of menarche.

TABLE 9

DISTRIBUTION OF CASES ACCORDING TO AGE OF MENARCHE.

Age of Menarche (in years)	Infertility patients	
	No. of cases	Percentage
< 10	-	-
11 - 12	5	9.8 %
13 - 14	31	60.78 %
15 - 16	14	27.45 %
17 - 18	1	1.96 %
Above 18	-	-

The commonest age of menarche was 13 to 14 years with 31 (60.78%) followed by age group 15-16 years 14 (27.45%). There were only 5 cases with menarche was at the age of 11-12 years, the least being at 17-18 years 1 (1.96%). There were no cases having menarche before 10 or after 18 years of age.

12. COITAL FREQUENCY -

TABLE 10

DISTRIBUTION OF CASES AS PER NUMBER OF COITAL EXPOSURES PER WEEK.

No. of coital exposures/week	no. of cases	%of total
1	7	13.7%
2	10	19.6%
3	22	43.13%
4 or more	12	23.5%

Majority of couples (43.13%) had intercourse 3 times a week followed by 23.5% of couple indulging in intercourse 4 or more times a week. 19.6% couples had a coital frequency of 2 times a week. Only 7 (13.7%) couples had a coital frequency of once a week.

13. PAST HISTORY -

A positive history of pulmonary tuberculosis was obtained in 3 patients, but they showed no active lesion.One patient had taken a full course of antitubercular drugs while two of them had irregular treatment for 3-6 months. There was no history of hypertension or diabetes.

14. PAST HISTORY OF GENITAL SURGICAL PROCEDURES -

TABLE 11

DISTRIBUTION ACCORDING TO PREVIOUS GENITAL SURGICAL PROCEDURES

Genital Surgical Procedure	No. of cases	%of total
Dilatation and curettage	3	5.9%
Previous endometrial biopsies	12	23.53%
Ruptured tubal pregnancy	2	3.9%

Of the 51 females , 3 (5.9%) had undergone dilatation and curettage in the past, 12 (23.53%) have had previous endometrial biopsies done and 2 (3.9%) had history of ruptured tubal pregnancy.

15. PAST HISTORY OF INFERTILITY TREATMENT -

Many of the patients had paid at least one previous visit to the hospital or some private practitioner for the treatment of infertility.

16. USE OF CONTRACEPTIVES -

Out of the 51 couples, 8 couples had used some form of contraception of which 6 had used intrauterine devices and 2 had taken oral contraceptives .

17. FAMILY HISTORY -

One patient had family history of infertility with her elder sister having the same problem.

18. GENERAL EXAMINATION -

Built - All the patients were of average built except 5 patients who were overweight.

Blood Pressure - The range of the blood pressure varied from 90-130 mmHg systolic and 60-90 mmHg diastolic.

Pallor - 10 cases were very pale and anemic and on investigation had a hemoglobin value of 9 gm%.

No patient had icterus, clubbing , cyanosis, edema or lymphadenopathy.

19. SECONARY SEXUAL CHARACTERS -

All the patients had well developed breasts and external genitalia.

20. PER VAGINAL EXAMINATION -

The details of per vaginal examination are presented in table 12.

TABLE 12

POSITION OF THE UTERUS IN FEMALE PATIENTS ON P.V. EXAMINATION.

Position of the Uterus.	Infertility patients	
	No. of cases	Percentage
Anteverted uterus	35	68.6%
Retroverted uterus	16	31.3%

It shows that anteverted uterus was found in 68.6% of cases and retroverted uterus in 31.3% of cases. Retroversion is an important cause of infertility.

TABLE 13

THE VARIOUS PELVIC PATHOLOGIES ON P.V. EXAMINATION

Gross Pelvic Pathology on P.V. Examination	No. of cases	%of total
Adnexal mass	6	11.7%
Small Uterus	4	7.8%
Pelvic Inflammation	7	13.72%
Fibroid uterus	1	1.96%
No obvious pelvic pathology	33	64.7%

This table shows that the most common pelvic pathology was pelvic inflammation in 7 pts. (13.72%) perceived as tenderness on per vaginal examination. This was followed by adnexal mass in 6 patients (11.7%). Small sized uterus was present in 4 patients (7.8%) and fibroid uterus was present in1 subject (1.96%)

21. PER SPECULUM EXAMINATION FINDINGS

TABLE 14

THE VARIOUS FINDINGS ON PER SPECULUM EXAMINATION

Per speculum findings	No. of cases	%of total
Cervicitis	6	11.76%
Vaginitis	4	7.8%
Cervical erosion	6	11.76%
Normal	35	68.6%

Per speculum showed that most pts (68.6%) had normal per speculum findings. 6 pts (11.76%) had cervicitis, 6 pts (11.76%) had cervical erosion, 4 pts. (7.8%) had vaginitis on per speculum examination.

22. RESULT OF CHEST X-RAY

No active disease was seen in any of the patients.

23. HYSTEROSALPINGOGRAPHY -

TABLE 15

THE VARIOUS FINDINGS ON HYSTEROSALPINGOGRAPHY

Tubal Block	Infertility patients	
	No. of cases	Percentage
Bilateral	5	9.8%
Unilateral	1	1.96%

9.8% cases had bilateral tubal block and only 1.96% cases had unilateral tubal block.

24. ENDOMETRIAL BIOPSY -

TABLE 16

RESULTS OF ENDOMETRIAL BIOPSY

Endometrial Biopsy	Infertility patients	
	No. of cases	Percentage
Proliferative Phase	22	43.13%
Secretory Phase	29	56.86%

43.13% of the patients showed proliferative phase in the endometrial biopsy reports, 56.86% of them had normal secretory phase.

25. RESULTS OF FOLLICULAR STUDY -

TABLE 17

RESULTS OF FOLLICULAR STUDY

Follicular Study	Infertility patients	
	No. of cases	Percentage
Anovulatory	22	43.13%
Ovulatory	29	56.86%

43.13% of the patients showed Anovulatory cycle while 56.86% of them had Ovulatory cycles in follicular study.

26. ULTRASOUND -

TABLE 18

RESULTS OF ULTRASOUND FINDINGS

Ultrasound	Infertility patients	
	No. of cases	Percentage
Tuboovarian Mass.	4	7.8%
Fibroid Mass	1	1.96%
Hypoplastic Uterus.	1	1.96%
P.I.D.	7	13.70%
Cystic Ovaries	3	5.8%
Bicarnuate Uterus.	-	-
Uterine Adhesions	2	3.9%

The commonest pathology detected by ultrasound was pelvic inflammatory disease (13.7%) , followed by TO mass in 4 (7.8%) followed by cystic ovaries in 3 pts. (5.8%). 2 pts (3.9%) had uterine adhesions while 1 pt. (1.96%) had fibroid uterus and 1 (1.96%) had hypoplastic uterus on USG.

27. ENDOMETRIAL BIOPSY FOR ENDOMETRITIS -

TABLE 19

DETECTION OF ENDOMETRITIS ON ENDOMETRIAL BIOPSY

Endometrial Biopsy	Infertility patients	
	No. of cases	Percentage
Endometritis	6	11.7%
Tubercular endometritis	2	3.9%

7 patients (11.7%) had chronic endometritis and 2 patients (3.9%) had tubercular endometritis

28. ANTISPERM ANTIBODY

No antisperm antibody was detected in any of the patients.

29. ENDOCRINAL DISTURBANCE

1 patient (1.9%) had hyperprolactinemia and 1 patient (1.9%) had hypothyroidism.

30. OVULATION INDUCTION BY CLOMIPHENE

Clomiphene citrate was given to the 22 patients with anovulatory cycles in a dose of 50 mg per day for 5 days from the 5th day of the cycle.

Follicular study conducted three months later showed the following results.

TABLE 20

FOLLICULAR STUDY AFTER CLOMIPHENE THERAPY

Follicular Study	Infertility patients	
	No. of cases	Percentage
Ovulatory	15	68 %
Anovulatory	7	31.8 %

This shows that in 68% of patients with anovulatory cycles, clomiphene induced ovulation.

FEMALE INFERTILIFY DIAGNOSIS

TABLE 21

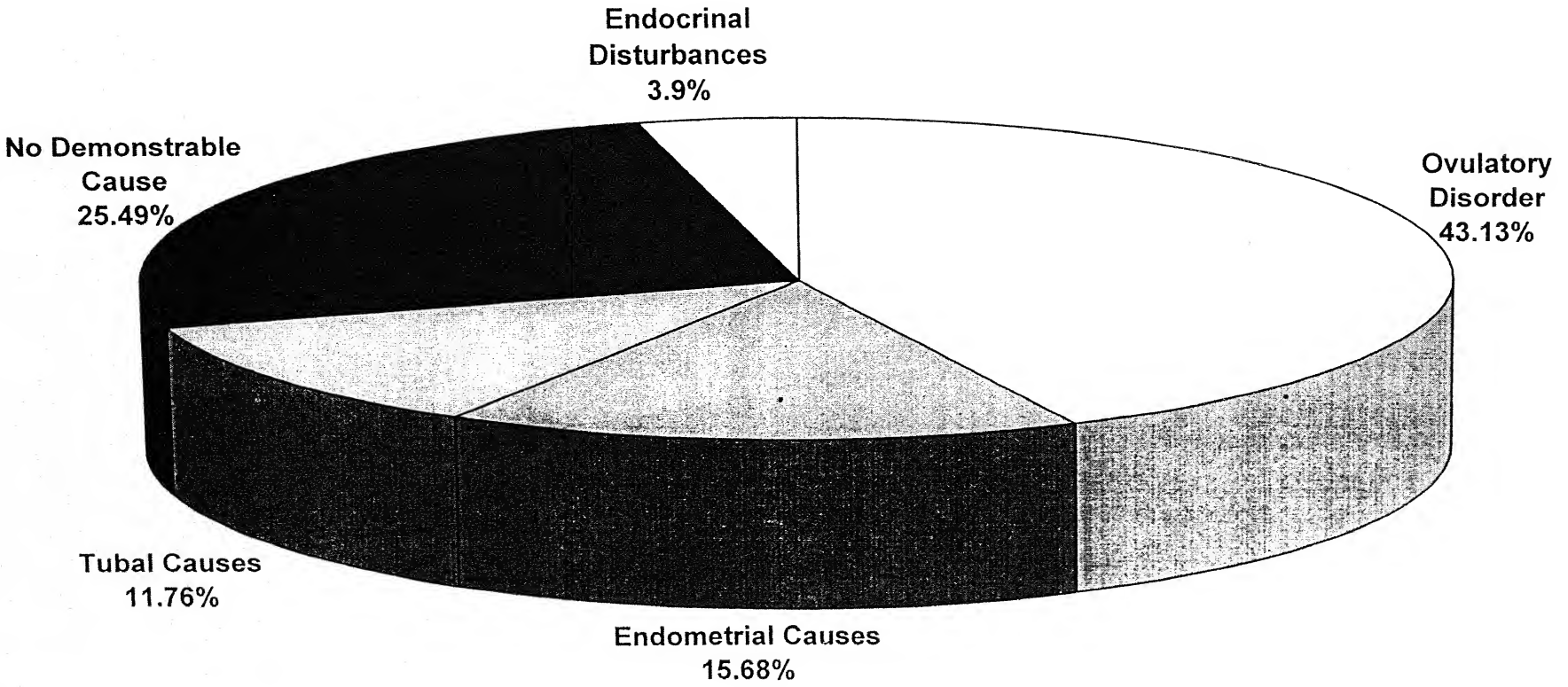
DISTRIBUTION OF FEMALE INFERTILITY DIAGNOSIS.

Diagnosis	Cases	Percentage
1. Ovulatory disorders	22	43.13%
2. Endometrial causes	8	15.68%
3. Tubal causes	6	11.76%
4. No demonstrable cause	13	25.49%
5. Endocrinal disturbances	2	3.9%

From these observations the commonest cause of infertility in our patients was ovulatory disorders accounting for 43.13% of all causes of

infertility , followed by endometrial causes which included both chronic endometritis and tubercular endometritis accounting for 15.68% of cases. Tubal causes were responsible in 11.76% of cases. Endocrinal causes like hyperprolactenemia and hypothyordism were responsible in 3.9% of cases of infertility. In the remainder 25.49% of cases, no demonstrable cause was found in the female partner in the infertile couple.

FEMALE INFERTILITY DIAGNOSIS



Discussion

DISCUSSION

The problem of infertility is as old as mankind. In spite of exhaustive research in all directions, no fool proof treatment is as yet available for these unfortunate people. It is now realized that in the majority of cases, both the partners are partly to blame for the infertility, and a complete examination of both marriage partners is mandatory to pin point and adequately treat the cause.

The present study consists of 51 couples in which 38 females (74.50%) were found to have some abnormality in their reproductive system. Of these 28 females (54.9%) were solely responsible for infertility, in 12 couples (23.52%) both the partners were at fault. In 11 cases (21.57%) the male partner was solely responsible and in 2 cases (3.9%) no demonstrable cause was found in either partner.

These data can be compared to most other estimates which states that infertility due to female factor alone accounts for 50% of the cases (which in our study is 54.9%) Both male and female factors account for 20% of cases (which is 23.52% in our study) and male alone are responsible in 30% cases (in our study is 21.57%).

1. Age Incidence -

In our study distribution of infertility according to age group showed that the maximum number of infertile women were in the age gp of 21-25 yrs. followed by the age group of 26-30 yrs. This contrasts with studies in the west where infertility is seen predominantly in later years. The reason

for this can be the trend of late marriages in the West which results in reduced fecundity due to ocyte depletion. It has been seen that after 27 yrs. of age the fertility of a female starts decreasing. Also marriage at an early age may be responsible for infertility as cycles are usually anovulatory .

3. Type of Infertility -

The study showed that 80.39% of the female patients were of primary infertility and 20.6% of secondary infertility. Around 10% of the pts had under gone surgical procedures like dilatation and curettage, previous endometrial biopsies (12%) and 1 patient had ruptured tubal pregnancy. These factors might have contributed to infertility.

4. Religion -

Most of the couples 90.2% were from Hindu community and 9.8% of couples were from Muslim community. The Hindu community being dominant in the area.

5. Occupation -

2 females were school teachers, all others were housewives. None of them were exposed to any occupational hazards and to any noxious agents.

Dr. Boguslaw Baranksi says that risk of infertility increases in females who reported exposures to textile dyes, drycleaning chemicals, lead, mercury and cadmium, anti rust agent, welding and plastic manufacturing.

6. Socio economic status -

74.5% of the couples belonged to the low socioeconomic status and 25.5% belonged to the middle class group, none were from the high socioeconomic status. Higher incidences of infertility in low socioeconomic group could be because Bundelkhand is an economically backward area and there is a high infection rate in this category due to poor hygiene and improper treatment. Sexually transmitted diseases are also prevelant in this category due to lack of awareness of prevention. Also poverty leads to deprivation of this group from nutritious food due to unaffordibility. Lack of proper nutrition adversely affects sexual functions. Food plays an important role in the process of ovulation. Deficiency of Vitamin A retards ovulation in growing animals while deficiency of Vit. B also cause infertility.

7. Rural or urban -

54.9% of the couples were from rural locality and 45% were from urban locality.

8. Age at menarche -

In our study the age of menarche was maximum between 13-16yrs. of age group (88.23%). 9.8% had menarche between 11-12 yrs and only 1 female attained menarche between 17-18 years of age. This is significant as delayed menarche is a pointer towards subfertility.

9. Menstrual history -

19.6% of female in our study complained of dysmenorrhoea. Congestive dysmenorrhoea can be regarded as a concomitant symptom of pelvic disease, salpingo- oophoritis, parametritis or pelvic adhesions. 15.68% complained of menorrhagia and 9.8% complained of polymenn

orrhoea. Excessive menstrual blood loss may be found in pelvic infection, retroversion of uterus due to ovarian hyperemia. Menorrhagia may be found in early stages of tubercular endometritis. Oligomenorrhoea and secondary amenerrhoea were found in 3.9% and 1.96% respectively suggesting primary or secondary ovarian subfunction. These are also common manifestations of genital tuberculosis. 1 case of secondary amenorrhoea in our study is attributable to hyperprolactinemia.

10. Use of contraceptives

8 females had used some from of contraception. Of them 2 had taken oral contraceptives and 6 had used intrauterine devices. In addition to the possibly increasing incidence of in fertility caused by postponement of childbearing, other factors contribute to the problem. These include increased risk of prolonged anovulation after the use of birth control pills and of adnexal infection associated with intrauterine devices.

11. Coital frequnency -

Majority of the patients (43.13%) had a coital frequency of three per week followed by 23.5% having a frequency of 4 or more. It has been seen according to the various studies that the rate at which pregnancy is achieved depends on the coital frequency, as more the frequency is more are the chances that intercourse will take place in the fertile period of the cycle.

12. Symptomatology -

In our study the most common complaint of the patient was leucorrhoea (31.37%) followed by backache (25.5%). Few women also

complained of dyspareunia, dysuria and pain in abdomen. The cause of prevelance of these complaints in infertile patient is because of the fact that the etiology in many of our cases was infective in which these are common complaints. Local congestive states of pelvic organs such as chronic PID, acquired retroversion, prolapsed congested ovaries are all causes of leukorrhoea.

13. Examination findings -

In our study 10 patients had haemoglobin levels <9gm%. This probably was due to the general prevalence of anaemia in our population and had no relation with the etiology of infertility On per vaginal examination 68.6% had anteverted uterus and 31.3% had retroverted uterus. Retroversion of the uterus may cause infertility, dyspareunia and backache. Fixed retroversion results from PID, chocolate cysts of the ovary or pelvic endometriosis.

The most common cause of infertility in our study is ovulatory disorders, found in 22 cases (43.13%). The definite method used to identify ovulation in our study was endometrial biopsy and follicular study. I.D. Cooks on behalf of WHO task force found that endometrial biopsy is more sensitive and specific in detecting ovulation and anovulation Treatment of anovulation in these patients was carried out with clomiphene citrate in a dose of 50 mg OD for 5 days from the 5th day of the cycle for 3 months. Follicular study was then carried out 3 months later and showed that 68% of the females with anovulatory cycles had ovulation.

Clomiphene citrate , because of its chemical structure, competes with estrogen for binding sites in the hypothalamus and possibly the pitutary. Being a weak estrogen, it has a weaker negative feedback effect on both gonadotropin releasing hormones and gonatropin so that the secretion of these two factors is increased. During the administration of clomiphene , there is a moderate rise both in FSH and LH secretion and a gradual accelerating increase in estrogen production by the ovary. If hypothalamic pitutary - ovarian function in potentially effective, the rising level of estrogen triggers an LH release similar to that seen in a normal cycle and ovulation ensues. The women most likely to respond to clomiphene therapy is the one with mild hypothalamic amenohorrea.

In our study 3 cases had cystic ovaries which did not have other features of PCOD but could have been an atypical presentation of PCOD which is an important cause of infertility.

Anoulatory infertility has been cited as 19% in the developed world , 17% in Africa and 21% from chandigarh.

Endometrial causes were found in 8 cases (15.68%) detected by endometrial biopsy and ultrasound of which 2 cases were of tubercular endometritis.

Tubal causes were seen in 6 cases (11.6%) with bilateral block in 5 cases and unilateral block in 1 case in HSG. Tubo ovarian mass was found in 4 cases (7.8%) and in 2 cases TO mass was present with bilateral tubal block. In 2 cases with tubal involvement, PID was found and tubal involvement usually occurs in PID.

Gargi Deshmukh et al in a study of population in Bombay used laparoscopy and found tubal pathology in 17.63% of their 430 cases, while Kanchan et al found tubal pathology in 52% of her cases. The WHO reports states this factor to be 30% in Chandigarh and 23% in developed world. In our study the discrepancy with the above datas could be due to the techniques used for diagnosis. In our study laparoscopy could not be done to confirm tubal pathology so it is possible we may missed tubal lesions. Laparoscopy is superior to HSG in diagnosing tubal pathology (Aniya Dokras et al 1989, Duingam and Coughlan 1972). Also ultrasound fails to detect any adhesion and can detect only mass lesion.

Tubal blocks, tubal adhesions most cases of tubo ovarian masses , PID and endometritis are infections in origin. 17 cases (33.33%) presenting with infertility had an infectious cause and most of them were tubercular in origin.

In 2 cases Endocrinal disturbances were responsible for infertility. One female had hyperprolactenemia with serum prolactin levels > 39.1ng/ml.

One female presented with hypothyrodism with reduced T_3, T_4 levels and raised TSH level.

In our study antisperm antibodies were not found in any of our patients. This does not necessarily reflect a time low prevelance. Two factors could be responsible for this. First, we used a less sensitive method for detection of antisperm antibodies i.e. the biological method compared to method used by various studies i.e. the immunobead test detecting

secretory antispermatozoal IgA, sperm cervical mucus interaction test. By using these methods various authors have detected ASA in 5-17% of females complaining of infertility. Second reason could be the small size of our study.

One case showed hypoplastic uterus in ultrasound with proliferative cycle in Endometrial biopsy. This hypoplastic uterus could be an associated congenital abnormality.

In 11 couples all the investigative procedures carried out in the females were normal but the male partner showed abnormal semen analysis.

In 2 cases no demonstrable cause of infertility could be detected. These patients were categorized as "unexplained infertility". Since all standard clinical investigations conducted in both the male and female partner showed normal results.

This unexplained infertility could be due to deficient luteal phases which can be assessed by both endocrine hormone profile (PPS) and ovarian ultrasonography (retained luteal phase cysts).

Studies have shown that abnormal luteal cysts diagnosed by the above method was found in 38% of cycles of women with unexplained infertility.

Next in line would be social factors. Most females who presented to the Reproduction medicine clinic for the first time held the belief that she is wholly responsible for infertility. Also, most couples were very hesitant to discuss about this problem and it was only after close questioning did they

come out with the real reason for their visit. However once the couple were educated regarding infertility most of the unwilling husband consented to be examined simultaneously with the wives.

Thus patient education should form an important aspect of every infertility programme. It is especially important to dispel any misconception and instill confidence in the couple. They should be made aware that investigating and diagnosing the cause of infertility involves a battery of investigations which is quite tedious and expensive but essential. The full cooperation of the couple is needed and they should regularly come for follow up. Finally, the basic aim of investigation of the couple is to provide them proper treatment so that they may be able to bear a child.

Summary & Conclusions

SUMMARY AND CONCLUSION

The present study "The extended clinco laboratory profile of the female partner in infertility in Bundelkhand region" was carried out in the Reproductive medicine clinic in the department of medicine, M.L.B. Medical college, Jhansi.

51 couple attending the clinic were studied and were subjected to a complete clinico laboratory evaluation. The data emerged from the analysis can be summarized as follows:

1. 74.5% of females showed some abnormality responsible for infertility.

2. In 23.5% of the couples, both partners were involved.

3. 80.39% cases were of primary infertility and 19.6% were of secondary infertility.

4. 74.5% of the pts were of low socio economic status. 54.9% were illiterate.

5. The major abnormality found was ovulatory disorder in 43.13% of cases as revealed by follicular study and endometrial biopsy which showed anovulation and proliferative cycle respectively . This finding is different from WHO study which showed tubal factors to be the most important cause of infertility in developing countries. The reason for this could be that the study group is too small, the diagnostic techniques used did not include laparoscopy, so subtle

tubal pathology might have been missed and few of the couples had also received prior treatment.

6. Endometrial pathology was detected in 15.68% of cases of which 3.9% had tubercular endometritis. This percentage is high compared to percentage of TB endometritis detected by the WHO study (0.5% of cases).

7. Tubal factor was found in 11.76% of cases with bilateral tubal block in 9.8% and unilateral in 1.96% of cases.

8. Abdominal ultrasound alone detected abnormality in 29.4% of all infertile females.

9. 13.7% of PID cases were found in our study suggesting infection as one of the causes of infertility.

10. Hyperprolactenemia and hypothyroidism contributed to 1.96% of cases of infertility each .

11. In 21.568% of couples no demonstrable cause was found in female and the male factor was responsible for infertility.

12. In 3.9% of couples no demonstrable cause was found in both male and female partner. This could be due to subtle hormonal disturbances. Hormonal profile of most of the patients could not be done due to high cost factor.

13. Comparison with other data showed that our spectrum of diseases responsible for infertility in Bundelkhand were typical of underdeveloped and socio economically backward region.

14. The above study shows infertility is a big problem in this area having adverse psychosocial impact on the suffering couple.

15. Patient education is important for dispelling miscon-ception and for a full and proper investigation of both the partner of infertility.

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Master
Chart

MASTER CHART

Sl. No.	Name	Age	Duration of infertility	Locality	Type of infertility	Endometrial Biopsy	USG Abdomen	Follicular study	HSG	Others
1.	Jamuna	22	4	Urban	Primary	Proliferative withc hronic Endometritis	PID	Ovulatory	NAD	-
2.	Gyan Devi	25	6	Urban	Secondary	Proliferative	NAD	Anovulatory	NAD	-
3.	Geeta	23	3	Urban	Secondary	Secretory	Rt TO mass with uterine adhesions	Ovulatory	B/L tubal Block	-
4.	Narmada	30	15	Rural	Primary	Secretory	NAD	Ovulatory	B/L tubal Block	-
5.	Mamta	23	2	Urban	Primary	Proliferative	NAD	Anovulatory	NAD	-
6.	Sunita	22	5	Urban	Primary	Secretory	NAD	Ovulatory	NAD	-
7.	Rajeshwari	20	7	Rural	Primary	Proliferative	NAD	Anovulatory	NAD	-
8.	Kusum	22	7	Rural	Primary	Proliferative	NAD	Anovulatory	NAD	-
9.	Anita	25	10	Rural	Primary	Secretory with Tub.Endome-tritis & chronic cervicitis	Rt TO Mass	Ovulatory	NAD	-
10.	Parvesh	22	8	Rural	Primary	Proliferative	NAD	Anovulatory	NAD	-
11.	Suneeta	24	7	Rural	Primary	Secretory	NAD	Ovulatory	NAD	-
12.	Archana	32	13	Urban	Primary	Secretory with Chronic cervicitis	PID to mass	Ovulatory	B/L tubal Block	-

Sl. No.	Name	Age	Duration of infertility	Locality	Type of infertility	Endometrial Biopsy	USG Abdomen	Follicular study	HSG	Others
13.	Sushma	32	12	Urban	Primary	Secretory	NAD	Ovulatory	NAD	-
14.	Guddi	25	7	Rural	Primary	Secretory	PID	Ovulatory	B/L tubal Block	-
15.	Geeta	18	3	Urban	Primary	Proliferative	NAD	Anovulatory	NAD	-
16.	Santosh	30	12	Rural	Primary	Secretory with tub. endometritis	Retention follicular cyst	Ovulatory	NAD	-
17.	Meena	26	5	Urban	Primary	Proliferative	NAD	Anovulatory	NAD	-
18.	Rekha	22	10	Rural	Primary	Secretory	NAD	Ovulatory	NAD	-
19.	Kamlabai	35	3	Rural	Secondary	Secretory with chronc endometritis	NAD	Ovulatory	NAD	-
20.	Firdaus	28	2	Urban	Primary	Proliferative	PID	Anovulatory	NAD	-
21.	Kamini	38	6	Rural	Secondary	Proliferative	NAD	Anovulatory	NAD	-
22.	Usha	28	10	Urban	Primary	Secretory	NAD	Ovulatory	B/L tubal Block	-
23.	Kumud	25	4	Urban	Primary	Proliferative	NAD	Anovulatory	NAD	-
24.	Anshu	25	2	Rural	Secondary	Proliferative	PID	Anovulatory	NAD	-
25.	Alka	26	4	Urban	Primary	Secretory phase	NAD	Ovulatory	NAD	-

Sl. No.	Name	Age	Duration of infertility	Locality	Type of infertility	Endometrial Biopsy	USG Abdomen	Follicular study	HSG	Others
26.	Sandhya	28	14	Rural	Primary	Secretory	NAD	Ovulatory	NAD	-
27.	Suneeta	19	3	Urban	Primary	Secretory	NAD	Ovulatory	NAD	Hyperprola ctinemia
28.	Kusum	26	5	Rural	Primary	Proliferative	PID	Anovulatory	NAD	-
29.	Pushpa	33	20	Rural	Primary	Proliferative	B/L Ovarian haemorrhagic cyst	Anovulatory	NAD	-
30.	Ramkumari	25	12	Rural	Primary	Secretory	NAD	Ovulatory	NAD	-
31.	Sukhdevi	25	6	Rural	Primary	Secretory with Chro. Endometritis	NAD	Ovulatory	NAD	-
32.	Ramkumari	21	6	Urban	Primary	Secretory	NAD	Ovulatory	NAD	-
33.	Sukhdevi	23	3	Urban	Primary	Proliferative	Hypoplastic Uterus	Anovulatory	NAD	-
34.	Salma	24	6	Rural	Primary	Secretory	NAD	Ovulatory	NAD	Hypothy-roidism
35	Gomti	22	9	Rural	Primary	Secretory	Rt TO mass with uterine adhesions	Ovulatory	Rt tubal Block	-
36.	Shila	31	13	Urban	Secondary	Secretory	NAD	Ovulatory	NAD	-
37.	Praveen	26	8	Urban	Primary	Secretory	NAD	Ovulatory	NAD	-
38.	Kanta	30	13	Rural	Primary	Proliferative	NAD	Anovulatory	NAD	-

Sl. No.	Name	Age	Duration of infertility	Locality	Type of infertility	Endometrial Biopsy	USG Abdomen	Follicular study	HSG	Others
39.	Urmila	26	10	Rural	Primary	Proliferative	PID	Anovulatory	NAD	-
40.	Rekha	26	6	Urban	Secondary	Secretory with Chronic Endometritis	NAD	Ovulatory	NAD	-
41.	Suman	26	6	Urban	Primary	Proliferative	NAD	Anovulatory	NAD	-
42.	Pramila	21	5	Rural	Primary	Secretory	NAD	Ovulatory	NAD	-
43.	Kastoori	28	11	Rural	Primary	Proliferative	NAD	Anovulatory	NAD	-
44.	Raheesa	30	13	Urban	Secondary	Proliferative	NAD	Anovulatory	NAD	-
45.	Rekha	26	8	Urban	Primary	Proliferative	B/L Cystic Ovary	Anovulatory	NAD	-
46.	Kamla	22	4	Urban	Primary	Secretory	NAD	Ovulatory	NAD	-
47.	Ganga	32	8	Rural	Secondary	Proliferative	Fibroid	Anovulatory	NAD	-
48.	Sultana	23	10	Rural	Primary	Secretory	NAD	Ovulatory	NAD	-
49.	Krishna	26	1	Rural	Primary	Proliferative	NAD	Anovulatory	NAD	-
50.	Vimla	26	11	Rural	Primary	Secretory with Chronic Endometritis	NAD	Ovulatory	NAD	-
51.	Kishori Devi	31	13	Rural	Secondary	Secretory with Chronic Endometritis	NAD	Ovulatory	NAD	-